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# IT Transformation to Support Business Driven Requirements

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<p>This Master's Thesis investigates the need for complete IT transformation in the case technology company by utilizing more cloud based solutions and adopting ITaaS service operating model. ITaaS is an IT Operating Model framework providing guidelines and practices for the companies to operate in modern agile business driven world where cloud services are heavily used. The proposed IT transformation target is to enable the case company's digitalization strategy and modernize ICT offering and capabilities to meet all business requirements, fast and efficiently.</p> <p>The objective of this thesis is to identify and analyze the demand and requirements for the IT transformation and create an executable IT transformation proposal. The study was conducted using a case study research approach. The data collection was done by using methods such as surveying the business requirement from the company digital strategy, business feedback, examining the company documentation and existing operating model. In addition, a 3<sup>rd</sup> party IT landscape survey was conducted to identify the pain points in the current operating model and to help preparing the scope of the IT transformation. The actual transformation approach and content was analyzed with the help of 3<sup>rd</sup> party consultancy and using extensively selected academic articles and books.</p> <p>The outcome of the thesis is an IT transformation proposal for the case company consisting of four phases; Cloud Adoption Blueprint and Strategy, Transformation Planning, Transformation, Optimizing and Finalizing. Each of the phases is proposed to be executed using agile practices and between each sprint the progress should be evaluated and the scope adjusted if needed. The main deliverables are public cloud transformation, revisited network architecture, configuration and asset management service, global cloud services and an ITaaS based operating model.</p> <p>The outcome of the thesis provided a business case and program plan for thorough IT transformation which was approved by the case company management. The program was initiated as one of the company key programs resulting in cloud strategy, heavily increased public cloud usage, two new IT services and numerous changes to the IT operating model. This thesis provides an excellent framework for companies to identify a need for IT transformation and make a plan for execution.</p>	
Keywords	Business Transformation, IT Transformation, Software Asset Management, Strategy, ITaaS, Cloud Strategy, Cloud Computing IT Operating Model, IT Governance.

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## Acronyms

ITaaS	IT-as-a-Service
IT	Information Technology
IoT	Internet of Things
ITIL	Information Technology Infrastructure Library
ITSM	IT Service Management
TCO	Total Cost Ownership
CAPEX	Capital Expenditure
OPEX	Operating Expense
CMDB	Content Management Database
SAM	Software Asset Management
ISO	International Organization for Standardization
IEC	International Electrotechnical Commission
IaaS	Infrastructure as a Service
PaaS	Platform as a Service
SaaS	Software as a Service
CaaS	Cloud as a Service
XaaS	Everything as a Service / Anything as a Service
API	Application Programming Interface
SLA	Service Level Agreement
RFP	Request for Proposal
vCPU	Virtual Central Processing Unit
VM	Virtual Machine
IPR	Intellectual Property
HR	Human Resources
VPN	Virtual Private Network
MPLS	Multiprotocol Label Switching
CDN	Content Delivery Network
EMEA	Europe, the Middle East and Africa
VDI	Virtual Desktop Infrastructure
CAD	Computer Aided Design
QA	Quality and Assurance
SACM	Security Automation and Continuous Monitoring
DNS	Domain Name System
SAFe	Scaled Agile Framework

## **1 Introduction**

Old ways to run IT operations are no longer suitable for the constantly changing business requirements due to inflexibility, lack of speed, agility and costs. This master's thesis studies the IT transformation concept and proposes an approach for a global technology company. One of the main obstacles during the IT transformation is lack of visibility and missing cost transparency. This master's thesis provides insight why the asset management is mandatory for successful IT transformation and answers through a use-case example what kind of framework is suitable for a global technology company. The framework will introduce what needs to be in place before the IT transformation can be fully started and how the asset management service supports transforming to meet modern world requirements.

### **1.1 Case Company Background**

This research was executed for the case company which is a global leader in minerals and metals processing technology. The case company also provides innovative solutions for industrial water treatment, the utilization of alternative energy sources and the chemical industry.

The case company has acquired more than twenty companies which has led to a wide spectrum of different IT services, software, hardware and processes. The service business growth and more demanding requirements from the business units have led to a genuine need to provide more visibility and control, add more automation, utilize cloud services and transform the traditional IT to something more suitable. These basic needs were the main drivers to start renewing the IT and understand how critical a role the working asset management has on the road of IT Transformation.

### **1.2 Research Background**

“Cloud computing, virtualization, mobility: Individually, these technology trends have brought sweeping changes to IT organizations for years. Together, they are driving the biggest disruptive force in IT today - the IT as a Service (ITaaS) revolution. IT organizations in every sector are feeling business and technology pressures to move to an ITaaS delivery model, where the focus is on business services more than technology products, and where IT brokers services as well as provides them (EMC2 2015: 1).”

The main driver for many companies will be the fact that the business has started to use IT services from outside the company due to internal IT being seen too expensive, slow and not flexible enough. Why to take money out from the company when it is possible to make money with IT internally as well? Usually it is a result from lack of visibility and understanding of IT services and their costs.

Cost savings and optimization may be a primary target of most efforts to move toward ITaaS but other indirect cost saving benefits such as consolidation, better visibility, more efficient business and IT processes, and more accurate cost models for IT services carry their own benefits. In the end, it does not matter what the original target is due to it usually leading to a wide and deep slate of benefits (EMC2 2015: 2). How many companies do know exactly all the IT assets and their cost structure? Does the business have full visibility to IT service costs and their value to the business? No matter which angle of planning is taken, it eventually leads to the cost transparency and knowledge of the existing landscape and services and how they affect the business.

Every organization manages costing and billing differently but common for all companies is that charging of IT services has always been problematic (especially internally) but starting to do it more simply and accurately is essential in the move toward ITaaS. There is no single approach how to do it so companies need to select the best one from various options from abroad allocation to usage-based chargeback, with many combinations and variations in between (EMC2 2015: 4). To manage the costs, one needs first to know and understand what is managed. Asset management will be in an even more key role in the future where assets are moved more and more to outside the company to the cloud services.

### **1.3 Business Problem**

The business problem of this study is to investigate how the case company's IT organization can meet the rapidly changing business requirements faster and more cost efficiently.

Currently, the case company IT cannot meet all the business requirement, demands are handled too slowly, services are not cost efficient compared to the global offering and the business is not served with required flexibility and agility. For example change requests take weeks to complete, public cloud services are not offered, the IT costs nor assets are not known on global level and new business requirements are often blocked

due to security policies or missed completely due to non-business oriented IT. Along with the challenges above there is a need for a more transparent and open operations model and better cost management. All this requires complete transformation and better asset management.

#### **1.4 Research Objective and Outcome**

Regardless of the IT transformation approach and targets, companies need to first evaluate and know their assets and services and define what will be the strategy in the future. This thesis goes through what IT transformation means and contains in practice and evaluates what are the boundaries and synergies with the asset management.

The objective of the research is to find out the best practices of IT transformation and create a proposal for the case company.

#### **1.5 Scope of Study**

IT transformation in a company is a change which usually takes years and requires massive efforts from the whole company. This master's thesis research mainly focuses on initiating the IT transformation and on the importance of asset management and more precisely of software asset management due to it being seen as one of the main corner stones in IT transformation. The importance of the software asset management is easily justified by the fact that in average the software of the company requires 15% to 30% from the total IT budget and companies use more and more cloud services where physical assets are no longer owned or managed by the company itself. The study of asset management is not limited only to the software asset management but focus on other areas too. This helps to understand the background and gives a better overall picture of the IT transformation at hand.

The outcome of this master's thesis research is an IT transformation proposal for a technology company.

#### **1.6 Research Approach and Method**

This section describes the research approach and methods used during the study to collect and analyze the data.



This thesis uses a mixed methods research due to it allowing to incorporate elements from both qualitative and quantitative approaches and a case study approach to verify the theory in practice. Yin (2003) describes a case study as “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context” (Yin 2003: 13) and in this research phenomenon is the question if the asset management is important for the IT transformation and does the case company IT require and benefit IT transformation.

Creswell (2009) defines the mixed methods research as “an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks. The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone.” (Creswell 2009: 4). The main reasons to select the mixed research model is that it enables triangulation which is also aligned with the case study approach as written by Yin (2003) that it “relies on multiple sources of evidence, with data needed to converge in a triangulating fashion” (Yin 2003: 14). In this thesis, multiple data sources are combined (data triangulation), things are looked from multiple perspectives to construe the result (theory triangulation) and mixed research approach is used in the study (theory triangulation).

In this thesis, different techniques are sometimes used simultaneously or one after the other to get to the best possible research results. As an example, face-to-face interviews with small group of experts was used to create a questionnaire and material to measure the findings with a larger group. Regardless of the measures used all the data used was analysed in an appropriate manner.

Work around the research was started already at the beginning of 2015 by investigating the IT transformation and creating building blocks for it. At an early stage, it became very clear that all the building blocks were dependent on deep visibility of the existing infrastructure and related costs. To have a complete visibility and cost details one needs to have a working asset management service. Asset management service itself needs to change as well during the IT transformation but it is also one the main and supporting building blocks for the overall change and later IT operating model.

In this thesis, the following seven steps were used to study the issue and create an IT transformation proposal supporting the overall company strategy:

1. Identify and analyze the case company business requirements and IT transformation requirements.
2. Make a current state analysis of IT operating model and analyze the case company's maturity of the software asset management.
3. Study IT transformation and software asset management.
4. Arrange transformation workshops, interview stakeholders and benchmark other companies.
5. Evaluate IT transformation best practices against business requirements.
6. Get consultancy help for the IT transformation planning and preparations.
7. IT transformation proposal.

In this method, all the steps have been selected so that it allows researcher to go back to previous steps to validate findings and continue working with them. To ensure as accurate outcome as possible all the steps were repeated until the final IT transformation proposal was completely ready.

### 1.7 Research Design

The research was conducted according to the following research design (see Figure1). The design was made purposely multilayered because part of the theoretical study could be performed only at a certain part of the project. The overall study was done in an agile way over a long time period rather than proceeding excessively step by step or following an exact schedule. This active process used is illustrated with the orange arrow (review, steer and re-evaluate) in Figure 1.

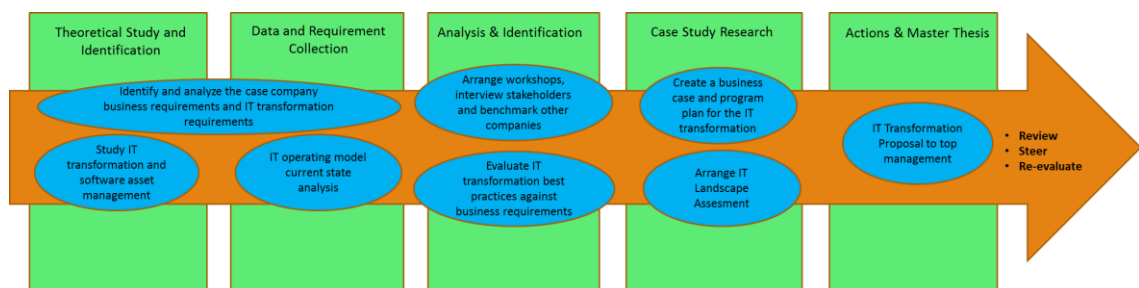


Figure 1. Research Design

As shown in Figure 2, there is a need to go through the IT operations, applications and infrastructure and evaluate the current state and create a roadmap for the future. Applications are one of the core IT transformation focus areas which lead to study the software asset management more deeply. These were conducted as part of the theoretical study and IT transformation research.

Based on the theoretical study, a high-level IT transformation strategy was drafted providing the actual requirements for the overall study. Based on the strategy and findings during the theoretical study it was possible to start identifying the software asset management dependencies in the IT transformation. This was carried out as a research work, arranging workshops and analyzing the existing company data.

All the steps were repeated multiple times until the requirements for the technical solution of the software asset management were known, piloted and proposed for implementation.

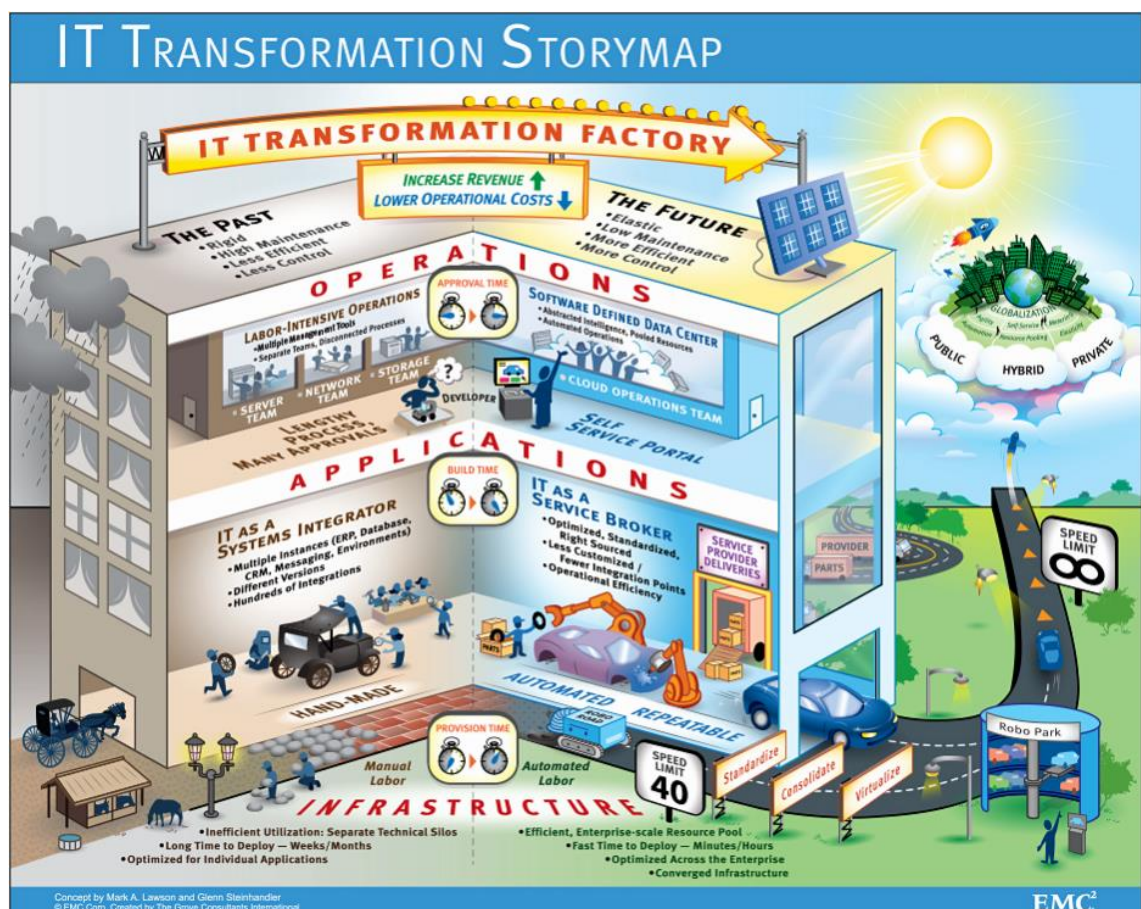


Figure 2. EMC2 IT Transformation Story Map (EMC2, 2015)

In the above Figure 2 the transformation has been illustrated with a car factory. First the old legacy infrastructure is replaced with standardized, consolidated and virtualized environment. Then manual processes are automated resulting shorter building and provisioning times. Operations will go through the same transformation and labor-intensive work is replaced with automatic self-services reducing approval and execution time. The last step is to use cloud services. All this should result to increased revenue and lower operational costs.

### **1.8 Data Collection and Data Analysis Methods**

Planning and preparing IT transformation requires understanding of the underlying situation and for that this study collected data in the following ways. First, an internal study was conducted on how to better meet the business requirements and what is potentially wrong with the current IT operating model. Second, the case company documentation was investigated to find out the pain points and future improvement possibilities. Third, a series of interviews, discussions and workshops were conducted in the case company. All the above study was supported by benchmarking other companies and using the help of an external consultancy company to guide the planning. The data collection for the study is explained in more detail below.

#### *Case company documentation*

To understand the current issues with the current IT operations, the researcher analyzed the case company IT documentation. Table 1 below lists the case company IT documentation used in the research.

Table 1. Case company documentation used and analyzed in the research

#	Name of the document(s)	Type of the document	Amount of Pages / Diagrams / Documents	Details
1	The Case Company RFP Templates	Documents	4 documents	Request for Proposal Templates
2	Information Security Policy and Guides for End-Users	Intra Page Documents	8 documents	Security policy, guidelines
3	Information Security Policy and instructions for IT personnel	Intra Page Documents	23 documents	Security policy, guidelines
4	Information Security Services documentation	SharePoint site	11 subsites	Information security services descriptions and guidelines
5	Services (IT Wiki)	SharePoint site	9 sites + subsites	IT services descriptions and guidelines
6	List of Case Company System and Service Owners	SharePoint Site	1 site	IT systems and system owners
7	Organization and Operating Model	Intra Page	Multiple sub pages	Organization Structure and Responsibilities Governance
8	Global support for business processes and applications	Intra Page	1 Intra Page	Support processes
9	Business Processes	Intra Page	Multiple sub pages	Business processes
10	Operating Model Handbook	Notes Application	100+ documents	Operating model handbook
11	Infra services	Confluence Page	19 sub pages (100+ pages)	Infrastructure service documentation in Confluence tool
12	3rd party outsourcing contract documents	SharePoint Site Documents	32 documents	Contractual documents Service descriptions Service agreements Service Level Agreements Cross Functional Processes
13	3rd party outsourcing ITIL functions documentation	SharePoint Site Documents	7 documents	Change Management Incident Management Templates Request Guide Collaboration Processes
14	3rd party outsourcing governance	SharePoint Site Documents	1 document	Governance manual
15	3rd party outsourcing service delivery documentation	SharePoint Site Documents	3 documents	Capacity management reports Data Center Asset reports Configuration Item reports

### *Interviews, Discussions and Workshops*

One of the data source is a series of interviews which were arranged to get a better understanding to the underlying issues from the IT stakeholders. These interviews are listed in Table 2. In addition to interviews and discussions, various workshops were held around IT transformation and asset management. During the research over 200 discussions or meetings were held with internal and external people in the case company around the IT transformation and asset management.

Table 2. IT Stakeholder interviews and milestone discussions

Person	Position	Topics	Schedule
#1	Global Network Service Manager	IT Transformation Requirements from the case company's IT stakeholders Interview	4/2016
#2	Global Hosting Service Manager	IT Transformation Requirements from the case company's IT stakeholders Interview	4/2016
#3	Information Security Officer	IT Transformation Requirements from the case company's IT stakeholders Interview	4/2016
#4	Engineering Applications Team Leader	IT Transformation Requirements from the case company's IT stakeholders Interview	4/2016
#5	ICT Infrastructure, Security and Collaboration Management Team Leader	IT Transformation Requirements from the case company's IT stakeholders Interview IT Transformation project proposal review and approval session Thesis follow-up sessions	4/2016 8/2016 4 times during 2015-2017
#6	ICT Infrastructure, Security and Collaboration Management Team Leader (previous)	Setting up the targets for the project and thesis	12/2015
#7	Service Operations Director	Setting up the targets for the project and thesis	12/2015
#8	Enterprise Architect	IT Transformation project proposal review sessions	8/2016
#9	Digital Applications Services Director	IT Transformation project proposal review sessions Software Asset Management PoC and Service proposal review sessions IT Transformation project proposal review and approval session	8/2016
#10	Senior Vice President - Operations Excellence	IT Transformation project proposal review and approval session	8/2016

### *Consultancy, Events and Benchmarking*

Seven different companies were met during the research to get benchmarking for the study objectives and 10 different companies were consulted. Details of the meetings (consultancy or benchmarking) with other companies are shown in Table 3 below. In addition to benchmarking, researcher attended over 30 different events to get more information about emerging technologies and solutions, digitalization, IoT, IT transformation and asset management. External consultancy was used during the research to help identify transformation needs, plan the transformation and asset management.

Table 3. Main benchmarking and consulting meetings

Company	Meeting Purpose	Meetings Amount	Topics	Duration
#1	Benchmarking	3	IT management Cloud services Security	3 hours
#2	Benchmarking	1	Global data management solutions Vendor comparision	2 hours
#3	Benchmarking	1	Outsourcing Digital services	5 hours
#4	Benchmarking	1	Support models	2 hours
#5	Benchmarking	1	Cloud providers Cloud transformation	3 hours
#6	Benchmarking	1	Digitalization IoT Cloud services Cloud transformation Development platforms	5 hours
#7	Benchmarking	1	Digitalization IoT Cloud services Cloud transformation Development platforms	5 hours
#8	Consulting	10+	IT transformation Cloud transformation Cloud services Global data management solutions ITaaS	30+ hours
#9	Consulting	10+	IT transformation Global data management solutions New technology reviews	20+ hours
#10	Consulting	10+	IT transformation Global data management solutions New technology reviews	15 hours
#11	Consulting	5	Cloud transformation Cloud services Global data management solutions	15 hours
#12	Consulting	3	Cloud transformation Cloud services	11 hours
#13	Consulting	20+	IT transformation ITaaS operating model New technology reviews Asset management	40+ hours
#14	Consulting	4	Cloud transformation Cloud services	10 hours
#15	Consulting	5	Global data management solutions Cloud services	12 hours
#16	Consulting	8	Asset management	25 hours
#17	Consulting	3	Asset management	6 hours

Results from the above meetings and sessions cannot be shared due to confidentiality. However, findings and other outcome has been used in the transformation proposal presented in Section 4.

### **1.9 Validity and Reliability Plan**

This study was done according to the qualitative academic research practices and concept to gain detailed understanding of the current problems and reasons behind. Interpretive analysis in the study and the data collected were reviewed from different angles and opinions from the stakeholders were considered. (Hennink et al 2011 9,16), (Maxwell 1996: 109)

The research reliability follows the reliability guidelines stating that the results of the research must be the same if some other person was to do the same research another time. (LeCompte and Goetz 1982: 32) To ensure the reliability different data sources were used by using different data collection methods and known research procedures.

Data validation was done by arranging many discussions, meetings and workshops with the company IT stakeholders. Business requirements were collected internally, using the help of an external consultancy and literature. The current state analysis was measured against multiple different sources such as interviews, benchmarking, discussions, internal documentation and consultancy according triangulation requirements. (Dan et al. 2002: 4). By using these methods, the outcome of the thesis as accurate and reliable both theoretically and as to best practices.

### **1.10 Structure of Thesis**

This thesis includes five sections. The first section describes the target and the scope of the study and the used method and material. The second section introduced the current state analysis together with identifying and analyzing the business requirements for the IT transformation. The third section concentrates on IT transformation, IT operating model and asset management research and best practices. The fourth section evaluates the IT transformation methods, introduces the IT landscape results and presents the actual IT transformation plan. The fifth section concludes the thesis, compares the results and outcome and argues validation and reliability.



## **2 Current State Analysis**

This section discusses the business requirements for the IT transformation and asset management in the case company. Next, the current operational model of the IT organization is reviewed to give a better insight to reasons for the IT transformation and to set the starting point for it.

### **2.1 Business Requirements for IT Transformation**

The main drivers for the IT transformation in the case company are coming from the new company strategy which requires change in the IT operations, feedback received from the business units during the last years and IT internal assessments regarding the need for IT transformation. The case company digitalization strategy is introduced in Section 2.1.1. The business feedback has been received through process owners, IT managers, application owners who are actively interacting with the business units' stakeholder. These persons participated various meetings and workshops (Section 1.8.3, Interviews, discussions, workshops) and that data represents the requirements for the IT transformation and asset management.

#### *2.1.1 Digital Strategy Requirements*

The case company digital strategy is summarized and analysed below to identify the IT operations elements that need to be enhanced or are not yet available in the case company IT. These requirements created a baseline for the overall IT transformation on strategic level and these strategic business requirements include: New skills and workload optimization, public cloud services and digital platform, cyber security and network architecture, data management and asset management. Some details of the digital strategy and analysis are not shared in this thesis due to confidentiality.

The case company digital strategy consists from three main strategic areas, digital solutions and operational backbone, digital customer engagement and digital operational backbone. These main strategic areas are illustrated below in Figure 3 presenting how all of those three areas are bound together and needs to work fluently together.

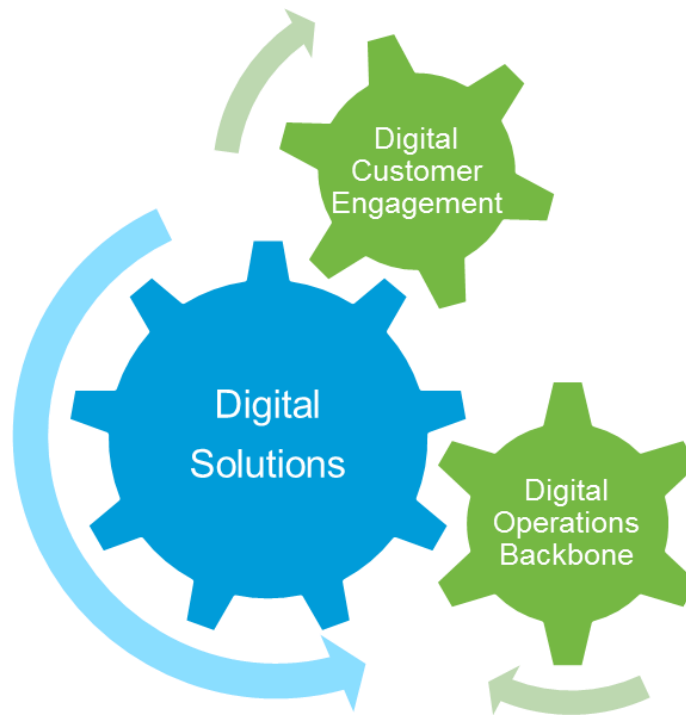


Figure 3. The Case Company Digitalization Strategy Diagram

The digital operations backbone will require infrastructure, governance model and services for the digital customer offering. These requirements are described in more detail later in this section. Digital customer engagement requires technical knowledge from IT to support with the customer cases. To enable digital solutions IT needs to enable development and operations for the digital solutions and provide efficiency via automation of case company business processes, common applications and rest of the IT.

#### 2.1.2 Industrial Revolution and Megatrends

Every single field of business is facing drastic changes. One can talk about the fourth Industrial Revolution (or Industrial Internet, IoT, Big Data) where world is very different from just 10 years ago in every industry. It could be summarized that the case company IT needs to be ready to support this fourth generation of Industrial Revolution but for the IT transformation more concrete requirements are needed.

The metals and mining industry is affected by several megatrends that are driving changes in the field:

- Lower investment risk goals that lead to an increased focus on capital efficiency.
- Productivity has become a major challenge in the industry in recent years.
- Skilled personnel with process experience are retiring.

- Sustainability (safety, environment, social responsibility) is becoming more important and regulations are becoming stricter.
- Available ore grades are declining, which affects processes and productivity.
- Technology push: new capabilities like computing capacity, artificial intelligence, sensors, and connectivity are enabling innovative solutions.

Digitalization brings with it opportunities to address these drivers in new ways – for example, by using digital solutions to improve the efficiency of the existing processes. However, digitalization also brings new requirements such as personnel skills which are also requirements for the IT. In the future, these persons need to be able to identify and adapt quickly to new business requirements, develop new solutions, learn new skills and have a customer focused mindset. These new skills required need to be identified, the existing skills needs to be re-evaluated and the focus of the personnel must be re-defined to optimize workload. New skills and workload optimization is an important business requirement needed in the IT transformation.

### 2.1.3 Digital Platforms

IoT helps manufacturers turn to advanced analytics, artificial intelligence, and machine learning to support predictive and prescriptive analytic solutions. By connecting previously stranded data from smart sensors, equipment, and other assets to advanced applications and predictive analytics in the cloud, IoT is becoming a strategic enabler to improve manufacturing performance creating pressure for the IT to keep up and provide help, support and solutions for these requirements.

The case company has a large pool of different solutions to support customers' digital transformation, from software applications and connected devices to optimized plant systems. In order to provide digital transformation for the customers the case company must have a working digital platform by itself. Digital platform in this context means an environment where development can be done easily and fast and it needs to support dynamic services for IoT, data analytics and other services that is needed to produce digital products. These digital products need to be available globally, anywhere in the world without forgetting cyber security. Another requirement can be identified from the digital strategy and that is *public cloud services and digital platform*. Without public cloud services, the case company will not be able to meet all the digitalization requirements nor able to provide dynamically scalable offering for the customers globally. Digital platforms require a defined and working *cyber security and network architecture*. These two requirements

will provide the connectivity for these digital services and make sure that customers can trust their data to the case company.

#### *2.1.4 Data Management*

Data alone has no value. Like the Earth's mineral resources, data is only a valuable resource when it has been processed to enhance business and cultivate innovation. We have more data available than ever before. In addition, the case company have now better tools to utilize it. This has already revolutionized several industries. While masses of data are produced by the industry every day, the lack of capabilities to refine the data remains the challenge. Amounts of data will increase all the time and along with the new digital solutions the data will not be internal only but it will contain more and more customer data. This will require a lot from the infrastructure (connectivity, security, data storing, etc.) but more important is that how that data is managed. We need to understand what the data is, who owns the data, how to secure integrity, availability and quality of the data along with many other requirements for the data like regulations and laws which are defining how and where the data can be located as an example. With increasing amount of data, it is even more critical that the case company knows what the assets are, where they are, who manages them and how the whole life cycle of the asset is managed. Along with cloud services and digitalization assets are not anymore fully managed by the company itself which brings new challenges for the asset management so this will play a key role in IT transformation.

#### *2.1.5 Common Business Requirements*

Along with the case company digital strategy, feedback of business requirements was collected from the business units via process owners, IT managers and application owners. Additionally, workshops and meetings around the IT transformation and asset management were arranged. Eleven different main topics were identified as key shared business requirements common for all business units and IT. These business requirements include: Cloud strategy and public cloud readiness, performance and user experience, global IT governance, automation and end-user services, cost efficiency, costs transparency and sourcing, workload and time optimization, modernization and consolidation, security, agility and asset management.

## 2.2 New Era – Future Insights Workshop

To get a holistic view of the different units' requirements for future operations and to get feedback for the IT transformation, multiple workshops were held. The main initiator for the IT transformation proposal was the New Era – Future Insights workshop which is introduced below.

Material presented in the workshop contained 69 slides in Power Point + other supportive material which cannot be shared due to confidentiality. This workshop was the first real IT transformation workshop with wide audience and it was held in May 2015 with the following three targets:

- Share knowledge of modern technologies, IT transformation needs and IT transformation in general.
- Gather requirements and feedback.
- Agree on concrete next steps to initiate IT transformation.

The workshop was one day workshop and it was prepared together with one of the case company's service provider and one external consulting company. Review session with the service operations director was held after the workshop to align findings and next steps. During the workshop, many findings were made and people learned what IT transformation would mean for the case company and what is required from the IT organization to get there. In this section, these findings from the workshop are analyzed and used to form a baseline for the IT transformation proposal.

### *IT Marketing*

One of the key topics discussed in the workshop was the imago of the case company IT, how the end-users and business see internal IT. How to break the impression how the rest of the organization see IT? How to start marketing IT services and turn around the view that IT is seen only as a cost? Make money with IT thinking should be adopted due to almost everything that business does nowadays, runs on IT solutions and enhancing those solutions have an impact. Many IT projects in the past has been introduces as a business projects even though the whole exercise would have been executed by IT and impacting IT systems only. Of course, in the end those systems are just enablers for the business to execute their work but why the merit could not belong to the unit who have made it possible? Positive feedback and profile lift of IT would have a significant impact to the IT employees' moral when they could be proud of their achievements and have a respect from the business. In the future projects IT should put more focus on advertising

the project internally and bring up the achievement facts how the IT will actually make money and how.

In the workshop, it was discussed that IT should look in to the mirror and change what IT do and how. These changes require that IT will spend more time with the business stakeholders. These stakeholders are already known and they are willing to work so all that is needed is just an attitude change. There should not be business unit, topic or service that IT is not supporting.

### *Reputation of IT*

IT reputation has been measured and the Service Desk which is the direct interface towards the end-users is not on an appropriate level according to the feedback. One of the issues that was also identified is that the whole IT is seen only as a Service Desk which is very concerning due to Service Desk being the 1st tier support. If the business sees the overall IT only as a 1st tier support they will not seek support for more advanced requirements. The conclusion was that this is also result of poor IT marketing internally and the IT not having been able to communicate their role, skills and knowledge correctly to the business. The target for the IT should be a single channel which can provide help and information regardless of the topic or complexity.

### *Tools*

New tools implementation has not been done in the best possible way due to the business not having taken them willingly in use and the feedback is not good. The workshop team concluded that there are simple remedies for this, such as better change management. IT needs to be able to communicate better the coming changes, communication must be understandable to the end-users, reasons for the changes need to be communicated and the end-users need to be educated to use the new tools. Data migration to the new environment must be done to avoid a situation where the business continues using the old and the new tools simultaneously.

Procurement of the tools needs to be more transparent so that everyone understands why certain tools are selected and during the assessment of a new tool, end-user feedback should be collected and listened to. Application landscape should be analyzed to find out if the tools are good enough or is there a need to change some to better ones.

### *Change Management*

The case company has many projects and different changes ongoing all the time and the business feedback is that there are too many changes at once and IT resources are overloaded. One of the reasons for poor feedback is that change management has failed and IT has not been able to communicate changes clearly and transparently. Change management should make sure that everyone knows what is happening, what they are supposed to do and how. This requires a solid communication plan, a lot of training, feedback collection and continuous change management.

There is a key-user network in the Case Company but it is clearly seen unutilized and needs to be revived. With an active key-user network the change management requires less efforts from the project organization and the end-users can get support to many problems quickly from the peers next to them.

Release management practices for the whole IT organization are a must and they should be actively developed. One of the basic things that every team can and should be doing is communicating releases in relevant internal communication channels. This is done already by some of the teams but not yet by all. In all, it was discussed that release management in general is one of the key activities that requires more attention and co-operation by all the teams. There is a development and release management road map but it does not contain all the teams' activities. There is an urgent need for a joint high-level road map which contains development and operations activities which can be then worked to more detailed activities.

### *DevOps?*

DevOps is seen as a hype word in the case company but during the workshop people started to understand the actual meaning behind the word. By adopting DevOps practices and way of working companies can achieve significant changes in their productivity and performance. Increasing automation in every possible way is one of the first steps that needs to be done but also the cooperation between the teams was seen as important task. IT operations need to participate development work from the beginning to ensure smooth transition from development to production.

### *One Global IT*

Even though the case company has a global IT, it is not working as one. The market area IT still works mainly independently and contributes to the global activities but not

as much it would be necessary. In IT transformation one of the main targets should be to bring the case company IT together so that everyone works together towards same goal, follow the same processes and way of working. The first thing to improve the situation towards business is to utilize regional heads to work together with product owners. This would bring the IT knowledge and understanding closer to the business and IT would get requirements and feedback faster than earlier and there would be less misunderstandings with the expectations when the communication is long between the originator and the party who executes.

### *IT outsourcing*

Outsourcing was discussed from two different approaches in the workshop. The first one, IT outsourcing by business which happens already and will increase if the case company internal IT is not able to provide the required services for the business. What happens is that the business will buy services outside if the internal IT is not capable of providing the required services, if the quality is not good enough or if the business is not aware that internal IT is able to provide that service. The case company is a fully business driven company and the business has control over all the coins which means that if the IT fails with their task, outsourcing the services cannot be prevented and it is not even wise because it would paralyze the business. Only way to tackle the situation is to make things right and better in IT so that there is no need to outsource the services. The case company needs to have one global service offering and business processes needs to be improved on a global level to avoid local unmanaged variations. Local and business lead solutions may seem to work well and appealingly but on a longer run they do not benefit the company and do not provide the best possible outcome.

One of the reasons for this kind of hidden IT solutions is the cost management and lack of transparency. The business is able to procure IT solutions without going via IT indirect sourcing and market area IT is able to purchase services locally without global IT having any visibility to the costs. This will lead to non-standard solutions which cannot be used nor managed on a global level. Transparent costs management is one of the key-items for the successful IT transformation and asset management.

Dialog with the business is required to agree on the fact that creating a new IT solution separately for individual projects is not wise, at least not without a plan to productize the solution so that it could be used again by other business units. This kind of guidance requires basic technical knowledge and understanding from the persons who are in direct



contact with the business or otherwise they are not able identify these early enough. Internal IT consultancy and advisory service for the business might be needed for the case company.

The second variation of outsourcing is IT outsourcing that is done by IT itself. The case company IT is managed mainly internally but there are not enough resources to do it efficiently. However, outsourcing blindly is not something that would resolve anything so this should be planned well and carefully. The common view is that certain basic tasks should be outsourced to free the time of the experts so they could concentrate on resolving more complex issues. The business would also benefit if there were end-to-end support for the whole IT infrastructure and 24/7 support for the critical IT components. Service management and development also requires more time which could be achieved by smart outsourcing of certain basic activities which require time from the current services and service management.

### *Benchmarking*

In the future IT should focus more on business outcomes and learn from other companies and industries. Continuous benchmarking what other companies are doing and having open discussions with other companies should be encouraged.

### *Work Packages from the workshop*

Based on the discussion in the workshop and issues that were raised, certain work packages could be identified for the future improvements. These work packages formed the first baseline for the IT Transformation requirements and can be found in Appendix 4.

## **2.3 Analysis of Current Operational Model**

To understand how the IT should be transformed it is mandatory to understand how the company operates currently because IT transformation changes the whole operational model.

The operational model describes how the customer (business) is served, services delivered, how the business objectives are met and how the organization is structured. In this study, the IT operational model covers the whole delivery chain of the IT operations.

This chapter discusses the company's current IT operating model explaining the main building blocks such as IT governance, IT services, IT technologies, policies, processes, sourcing, cost management and workload management. These building blocks were identified to be important during the workshops and planning of the IT transformation. After literature study and consultancy from external companies these operating model elements have been categorized under same structure which is used in operating model which will be researched in Section 3.4 (IT operating model for IT transformation). These eight key building blocks of the current IT operating model are discussed below under the following main categories; services, finance, organization and technology. Table 4 illustrates how the existing IT operating model building blocks are found under these four categories including the business requirements identified in the earlier section.

Table 4. Main building blocks of the existing IT operating model

<b>The main category</b>	<b>Current main operating model building blocks and business requirements</b>
Services	IT services Cloud Strategy Performance and user experience End-user services
Finance	Sourcing Cost management Cost efficiency and transparency
Organization	Global IT governance Policies Processes Workload and time management Agility
Technology	IT technologies Public cloud readiness Automation Modernization and consolidation Security

These main operating model building blocks are not the only ones requiring the change but it is good to focus the transformation first to the most important ones or to ones requiring change most urgently. Urgency should be reflected to direct business value instead of IT's own opinion of importance.

### *2.3.1 Services*

The case company delivers IT services using the IT System Management (ITSM) model which is based on the IT Infrastructure Library (ITIL) best practices. The current model is process oriented and the main targets are fulfilling business needs, bring value and deliver the agreed services according the agreed service levels. To get better understanding what services would need to be under transformation, details of the case company services can be found in Appendix 1.

#### *Performance and user experience*

Performance and user experience is measured only for the core application services to ensure agreed service levels towards the business.

#### *End-user services*

Currently the case company does have a wide range of end-user services but almost all those processes contains manual processes. Good example of a manual end-user service is a software order which is not fully automated end-to-end. Another example is the server provisioning which is not automated.

#### *Cloud strategy and demand for public cloud readiness*

Following the digital strategy and according to the feedback there is a need to have a cloud strategy and readiness for the public cloud. Certain cloud services are already used but there are no clear global strategy defining rules for using cloud services and a support model is completely missing. A logical target is to utilize more cloud services and less on premises infrastructure due to it will support the digitalization strategy and will standardize the IT infrastructure.

### Service support

The case company's global support model is a unified concept, which helps users with operational model issues related to case company's business processes, applications and information. Figure 3 shows how the services support is arranged in the case company IT.

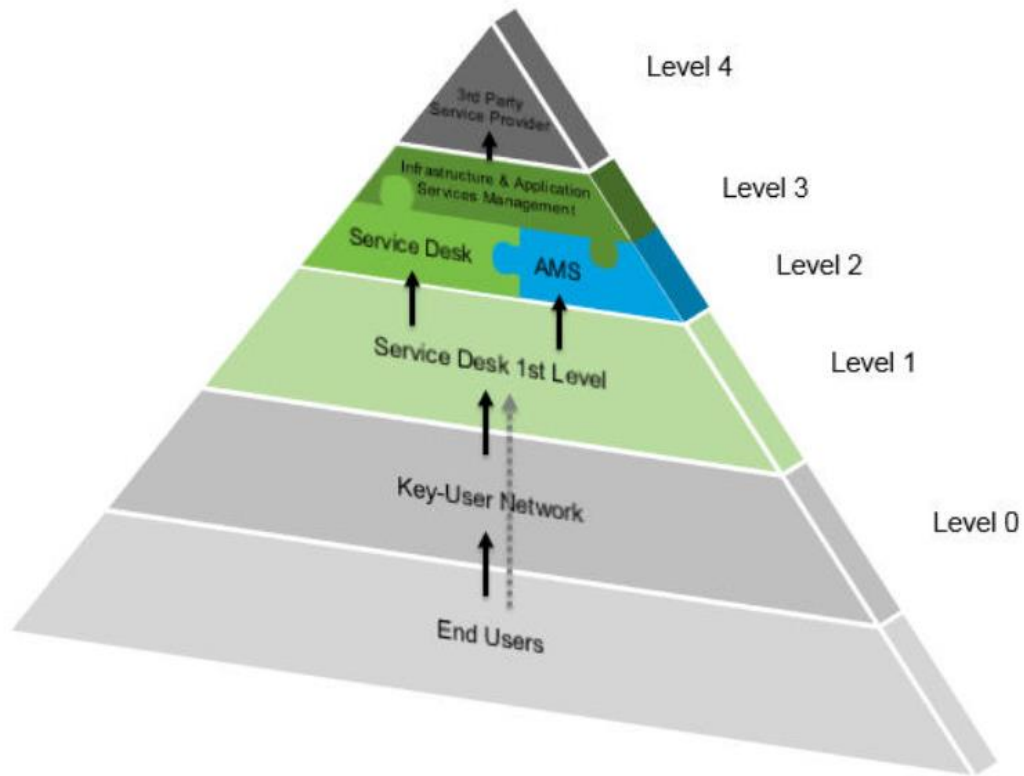


Figure 4. The case company global support model levels (case company documentation 2017)

Table 5 below explains all different levels of the service support defined in Figure 4. As seen, the case company support is heavily insourced currently and only small part of the operations are managed by 3<sup>rd</sup> party support.

Table 5. Global support model - support levels

Levels	Level descriptions	Support roles
Level 0	A key user acts as liaison point in general for end-users and towards a servicedesk. Local process owners support on process issues and record & escalate change requests towards development. Local data	End-users Key users Local Process Owners Local data clerks

	clerks handle data requests locally and advise end users.	
Level 1	The servicedesk acts as single point of contact for end users, reports incident via a ticket tool, solves issue (or escalates to next level) and sends resolution back to end user.	Service Desk
Level 2	Resolves issues (or escalates to next level) which have been send via a ticket system from the servicedesk and records solution to a ticket system.	ICT Specialists AMS Support Partner
Level 3	Resolves issues (or escalates to next level) which have been escalated from Level 2.	ICT Specialists System Owners Application Service Managers
Level 4	Resolves issues which have been escalated from Level 3	3rd Party Service Provider

Peer support is always the first level support and in the case company this level is called Level 0. When the colleagues are not able to help end-user should contact servicedesk that is Level 1 in the support model. Level 2 can take two different paths, either the request is escalated to the subject matter ICT specialist or to external Application Management Support (AMS) partner. Level 3 is the highest internal support level where the most complicated issues and requests are handled. This level also owns the architecture. The last level of support is Level 4 that is used in special occasions when none of the earlier levels are able to support. Usually this means buying external consulting to some specific issue or escalating to 3<sup>rd</sup> party vendor because of bug in their system.

### 2.3.2 Finance

The case company IT has a dedicated sourcing unit which purpose is to ensure that sourcing is always done according the company's policies and to help during the sourcing negotiations.

### *Cost Management*

Currently IT costs management is not globally centralized and all the IT costs are not known on a global level. Cost management is very traditional and most of the IT assets

costs are investments and paid in advance for years (assets managed by the case company itself) and external services are invoiced monthly and service contracts may be as long as five years. The current cost management model does not support rapid business requirement changes and it is not cost efficient due to invoicing is not fully based on utilization and cannot be dynamically scaled.

#### Cost Efficiency

The case company core application environments are hosted by a 3<sup>rd</sup> party vendor in a private cloud environment where the current price model is based on monthly fees and the asset management is bundled in the price. Based on the cost management figures and feedback this kind of model is not acceptable anymore.

#### *Costs transparency and sourcing*

Total Cost of Ownership (TCO) is a vague term at the moment in the case company when discussing IT services due to costs transparency is missing and there is not a proper asset management service in place. In practice, there is no means to calculate total costs of certain application environment due to previously mentioned reasons.

#### *Public Cloud sourcing*

The case company is not using any public cloud services or cloud operators at the moment. The sourcing itself does not change due to IT infrastructure and applications service management are sourcing the cloud when that is required and IT is acting as a cloud broker for the business units. The cloud operator who would be managing the cloud needs to be selected even if one of the current legacy infrastructure service support and maintenance providers could act as the cloud operator. Sourcing model of the company requires that in these kinds of situations there must be a bidding phase. Legacy infrastructure in the existing service providers hosting environments also needs to be measured and re-evaluated if the case company is satisfied to their service at the moment and what are their capabilities to support public cloud services and infrastructure. Selecting the cloud vendor and cloud operator are further discussed in Section 4 when building a proposal for the case company.

#### 2.3.3 *Organization*

The purpose of IT governance in the case company is to bring more structure around the IT strategy alignment with business strategy and ensuring that strategy and targets are met. IT governance purpose is also to make strategic decisions, ensure that all stake-

holders' interests are considered, risks are mitigated and that business continuity is secured. Key metrics management, budget management, making strategic decision and ensuring that resources are efficiently allocated are also part of the IT governance in the case company.

The case company's IT governance and organizational structure has changed multiple times during the research study. In the latest organization, the whole IT is under one umbrella supporting the targets of the IT transformation. The earlier governance and organizational structures are in the focus of the current state study due to it has been the baseline for the research project. However, the organizational changes have been considered when making the IT transformation and asset management framework proposal in the thesis. Earlier the case company had separate IT units in each market area and there were multiple IT units supporting business but in the new organization also the local IT units are part of the operational excellence organization instead of local market area. Presently, separation between business IT units and corporate IT units should no longer exist and everyone should act as a one IT but this is not yet true in real life.

Figure 5 below shows the IT governance of the case company. The organization units marked with orange are purely IT and other ones are supportive functions. All the IT operations and application services are in the digital application services unit. Digital solutions platform is a development unit. Architectures and concepts unit is responsible for the enterprise architecture. Digitalization unit is a temporary program organization.

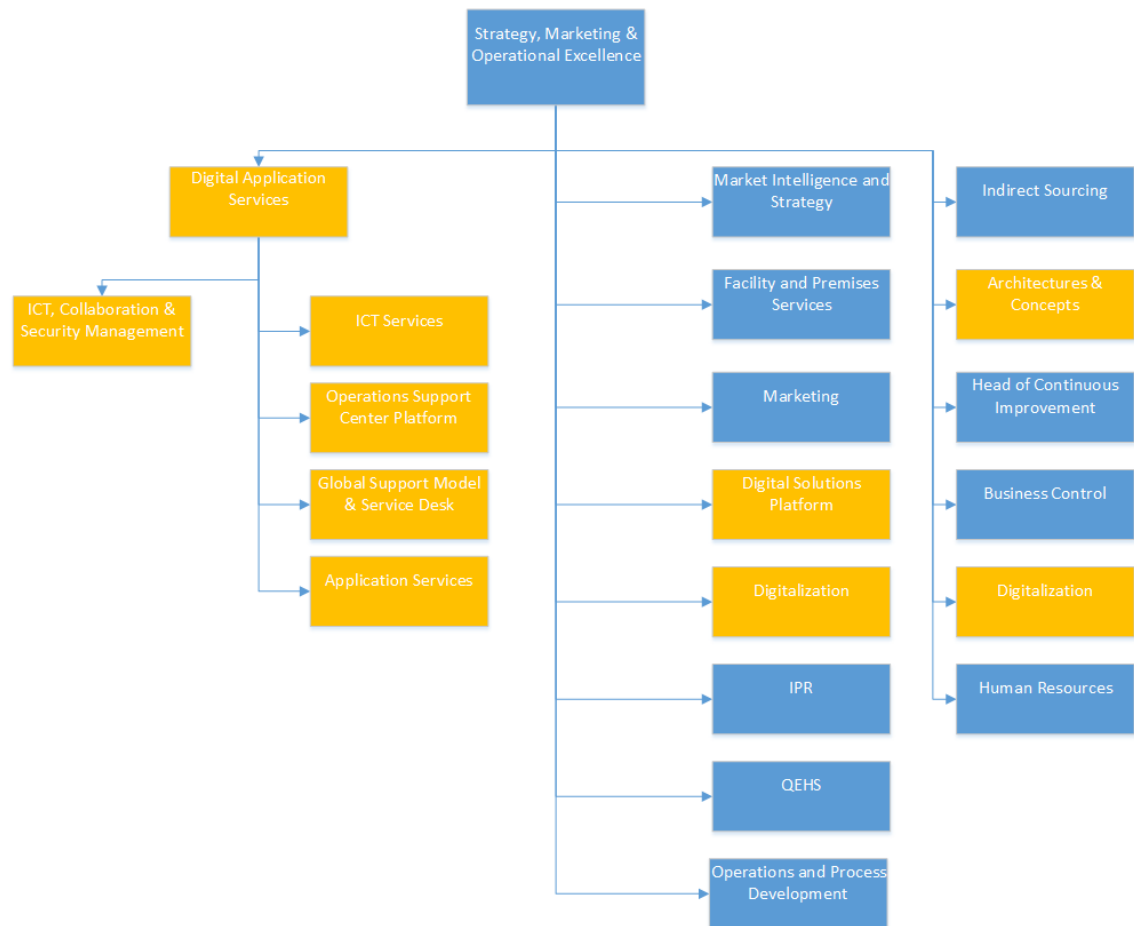


Figure 5. IT governance of the case company

### Processes

The traditional IT operational processes are based on IT Service Management (ITSM) model and often based on Information Technology Infrastructure Library (ITIL) best practices and framework. ITSM focuses on customers and is a practice using various processes. (ITIL Glossary 2011). The case company is currently operating by the ITSM model and following the ITIL best practices. As seen in Table 6 the case company is using all the ITIL recommended processes and functions but not all fully operational. The most important processes in use are Information Security Management, Supplier Management, Service Level Management, Capacity Management, Availability Management and Incident Management. Almost half of the processes are not fully in use or not working properly. All the functions are operational to some extent.



Table 6. ITSM processes and functions in the case company based fully on ITIL practices (ITIL 2011)

			Technical Management
	Service Catalogue Management	Transition Planning and Support	IT Operations Management (Function)
	Information Security Management	Evaluation	Application Management (Function)
	Supplier Management	Service Validation and Testing	Request Fulfillment
	Service Level Management	Knowledge Management	Access Management
Service Portfolio Management	Capacity Management	Change Management	Incident Management
Demand Management	Availability Management	Release and Deployment Management	Problem Management
Financial Management	IT Service Continuity Management	Service Asset Management and Configuration Management	Service Desk (Function)
Service Strategy	Service Design	Service Transition	Service Operations
Continual Service Improvement (CSI)			

The Continual Service Improvement (CSI) process has been drawn in Table 6 and it should be visible in all the IT service management phases. This is not how it works because many of the identified issues are related to the missing continuity. CSI should be one of the main focus processes because it is bounding everything else to one working concept.

#### *Workload Management*

Workload management is mainly concentrated to incident management and operational tasks and there are no consistent mechanism or management how the work is organized between operations and development. This is mainly visible through that same persons work with operational tasks and development tasks and according to the current state analysis the team is heavily over burdened with operational activities and there is not enough time for development and service management.

### *Agility*

In the case company server provisioning, capacity and change management is taking much time due to non-working requests and approval processes but mostly it is due to lack of automation.

### *2.3.4 Technology*

The case company does not have many standardized technologies in use due to non-harmonized global IT in the past, many acquisitions and merges and missing standards.

### *Modernization and consolidation*

The case company has a lot of old and legacy infrastructure that requires replacements and updates. In more than fifty sites there is some sort of local IT infrastructure (storage solutions, backup solutions, servers, network devices, local applications) that is not centrally managed, inventoried nor up to date. There is a high need and potential to centralize and automate services, and utilize more cloud based services due to legacy infrastructure is not anymore serving the purpose. Unmanaged capacity means no warranty and no service level agreement which is a risk for business continuity. Unpredicted CAPEX investments are emerging by surprise due to missing common strategy and roadmap.

### *Security*

In the case company security is seen more as a problem maker than necessity due to it usually makes things a little bit harder to complete or even prevents something that has been planned. Security policies and guidelines are well defined for the end-users and IT personnel's. The case company does not have a comprehensive security policy for the cloud services and operations.

## **2.4 Analysis of Current Asset Management**

Asset management as a term is not used much in the case company and there is no dedicated service for it. Asset management is something that is expected to be handled by each of the service themselves. Due to many merges and acquisitions the case company asset spectrum is very wide and poorly managed. The global visibility to assets and costs is missing and there is no centralized control and management.

### *Configuration management database*

A Configuration Management Database (CMDB) is a database which can be used to store configuration data of the company's IT assets and information how those are related to each other. Asset can be hardware or software and CMDB contains as much as possible data for each of the asset such as license information, stakeholders, invoicing data, incidents and configuration details.

The case company does not have CMDB even though company have a considerable number of IT assets which cannot be managed manually efficiently. For the global core applications of the case company that are hosted by a 3<sup>rd</sup> party, there is a vendor's own CMDB in use but that contains only the 3<sup>rd</sup> party infrastructure assets.

### *Software Asset Management (SAM)*

Software Asset Management is a process to manage and optimize the purchase, deployment, maintenance, utilization, and disposal of software within an organization. Software Asset Management is standardized by ISO and IEC in May 2006 and latest edition is published in 2012. (ISO 2012)

Corporate strategy for the software assets does not cover anything else than the core business applications at the moment. There are no global software purchasing process in place except for few applications, deployment processes are not globally standardized (example software packaging process) and there is no end-user self service automation in place. Lifecycle management of the software assets barely exists at all and retirement process is not in use. Missing retirement process causes that there are lot of legacy software in use which should have been ramped down years ago but they are still causing headache for the support organization. Unmanageable collection of software is not the only issue but missing version control has increased a security risks due to unsafe product versions are still in use. Licensed property is not controlled, managed nor optimized which causes company waste money due to over provisioning and generated a considerable risk for fines during the license audits.

### *License management*

The case company has multiple enterprise agreements with different software vendors and global license and purchase information is globally available for those software but license usage is not monitored, optimized or managed centrally except from the contractual point of view. Some of the software are using license servers keeping usage and license compliance in control. Everything else can be thought to be in uncontrolled state

due to missing costs transparency and visibility to usage. The analysis reveals that case company is under vendors' license audit almost every year once or more. Due to missing real-time software inventory and recognition audits are very time consuming for the case company IT resources.

#### *Summary of the asset management*

The current state analysis confirms that asset management is poorly managed at the moment and based on the business requirements and study this will cause issues for the IT transformation as well. Global visibility to the assets (software and hardware) including cost transparency, centralized control and life-cycle management process must be part of the IT transformation.

### 3 IT Transformation and Asset Management Research

This section overviews the IT transformation and the main elements of the IT transformation, software asset management and software asset management tools and discusses dependencies on each other during the IT transformation. First, this section overviews the IT transformation, how it is seen on the market in general and what does it mean for the organization as a concrete plan. Second, it overviews software asset management and tools and what makes it so important for companies and for the IT transformation.

#### 3.1 IT Transformation

Gartner-Forbes (2012) has investigated expectations for IT departments in their Board of Directors survey. From the 175 surveyed directors 86 per cent expected that IT will be a strategic contributor in the future. According the survey IT is seen as an enabler for the business model change and gaining more competitiveness on the market. Innovation and improved efficiency is seen as main drivers for the change. (Gartner 2012), (Tieto 2013:2)

IT needs to step out from the shadows and show how IT can find and deliver value for business. How to make money with IT should be constantly in every IT employees mind nowadays. According Gartner's research there are three best practices how IT can demonstrate the value of IT services. First the IT services should be defined in the language of the business so that business stakeholders can understand it. Secondly services should be bound to business outcomes by creating value statements. The third action is to identify the metrics how to measure the business impact. (Gartner 2012)

##### 3.1.1 *Market Definition of IT Transformation*

IT Transformation is a term which is widely used in IT business but not commonly defined as to what it actually means. Investigation of what IT transformation means requires a wide spectrum of different definitions to find common parts for the IT transformation. The most common way to meet the term IT transformation is in different companies offering IT transformation consulting.

Accenture defines IT transformation as a way for the companies to make business more efficiently.

*“Create an IT transformation agenda to drive business innovation, execution and agility through process, technology and culture change.” (Accenture 2017)*

The world is changing rapidly and new technologies are emerging faster than people can follow and at the same time expectations are raising. This brings a heavy pressure for the IT organizations when the business and customer expectations are high but everything should be done with as low cost as possible. To meet the challenge requires strategic thinking and companies must be able to make smart technology choices and transform the IT operations and capabilities to direction that enables cost-effective and fast way to support business. (Accenture (2017)

Tieto (2013) uses the term Business and IT transformation for their service offering which targets to make IT ready for the future needs of business by transforming people, processes and technology. According to them many companies' IT are struggling to be innovative at the same time when they need to manage complex legacy environments. They approach IT transformation from the business transformation perspective which is inevitable in order to stay on the market. By transforming the business, IT landscape need to change to drive and enable business change. (Tieto 2013)

*“More value for less, economies of scale, globalisation and disruptive technologies. The world is changing rapidly and so is business. Technology is an enabler and a driving force behind business transformation.” (Tieto 2017)*

It is quite clear that the reason for IT transformation is always the business transformation that drives IT to transform along. There is no right way to make the transformation due to every business and company are different but there are common elements that can be followed. IT transformation could be summarized to 'changes needed to adopt new business requirements'. IT transformation is usually seen a comprehensive change which will affect almost everything in the companies but the scope depends of the company and state of the business. Table 7 summarizes the main IT transformation drivers and the targets the transformation usually contains.

Table 7. Main IT Transformation drivers and affected elements

<b>IT Transformation drivers</b>
Make business more efficiently
Drive business innovation
Drive business execution
Drive business agility
Globalization
Disruptive technologies
Business transformations
More with less money
Economies of scale
<b>Elements where the changes are needed</b>
Process changes
Technology changes
Culture changes
Cost efficiency
Increased agility
Cloud strategy
Cloud transformation
Infrastructure assessment and planning
New IT operating model

IT transformation driver to make business more efficiently is a very high-level requirement but it should be seen as a main guideline that whatever IT does it should have a positive impact to the business. Driving business innovation, execution and agility are related to cloud services that are seen to provide these capabilities. Globalization means that all the services should be globally available from anywhere and anytime. Disruptive technologies cannot be defined because it contains everything new that might make the business more efficient and produce new business. Business transformation is the overall change how the business is changing, how the business is executed and so on. More with less money simply means what it says. Economies of scale drives to savings via increased production. The elements where the changes are needed are analyzed on the following sections.

### 3.1.2 *IT Transformation Content and Structure*

IT transformation is a result of business transformation that requires IT to change as well to be able fulfill business requirements. How to get there and what are the best practices is the focus in this section. The researcher analyzed various IT transformation models and the common feature to almost every model is that they are all based on the IT-as-a-Service (ITaaS) IT operating model. Many of the investigated models have several same steps in the transformation model. These steps might contain slightly different terms and presentation of the model may vary but after deeper analysis they are close to each other. Below two of those models are presented to give a better understanding to what is needed, why and how.

#### *IT transformation model by Tieto*

Tieto (2017) approaches the IT transformation from the same approach as the others as in that IT needs to transform to meet changing business requirements. According to them 80% of IT spend goes in average to maintaining operations (OPEX) and from the 20% left over there is usually not enough to invest to modern technology that would give competitive advantage on the market.

Transformation begins from the vision where the company wants to be in the future (To-Be Target) and why. This requires understanding first the current business needs and challenges. Business activity needs to be monitored and business case for the business transformation must be understood. After the target is known and understood it is essential to make assessment for the existing operations (as-is-analysis), try to anticipate future needs and use business drivers for the planning. Before the implementation there is a need to have achievable roadmap and deployment plan (Blueprint). IT landscape needs to be surveyed and plan must consider available corporate resources, budget, pain points and timeframe for the change. People, processes and technologies needs to be aligned and things needs to be prioritized. (Tieto 2017)

Actual transformation (execution) is split to five different steps but some of the steps can be executed in parallel (see Figure 6). Implementation is done across the business processes, applications and infrastructure using agile methods to allow early value harvesting, quick adaptation to new business and to control risks. Each of the steps will free capital and creates room for new investments and makes is possible to move to the next step. After every step, the progress and target is thoroughly re-evaluated and new roadmap and deployment plan is created according to the current situation and vision. (Tieto 2017)



In the first step, the target is to reduce operational IT costs by utilizing cloud, offshore and SaaS services to reach operational excellence. The second step is to leverage IT to improve productivity and efficiency by improving the changes done in the first phase. This is done for the entire IT function including employees and services. Employees are trained and they get more productive. Savings from the step two are used to optimize business processes and leverage IT more. The third step is to optimize the IT landscape to meet the business requirements. In this phase, the opinion of the IT will start changing because IT will increase agility and scalability and becomes key support functions for the business. Complexity will reduce and time to production will get much faster. Business time to market enables new business and competitiveness. Infrastructure, application and development costs are reducing significantly freeing budget for the next steps. The fourth step is to help business to differentiate themselves from the competitors. This is achieved by using IT as a source of agility to implement new thing that are needed by the business. The fifth step is to start utilizing disruptive technology which provides means for new customer engagements, value chains, business and other revenue sources. (Tieto 2017) Introduce Figure 6.

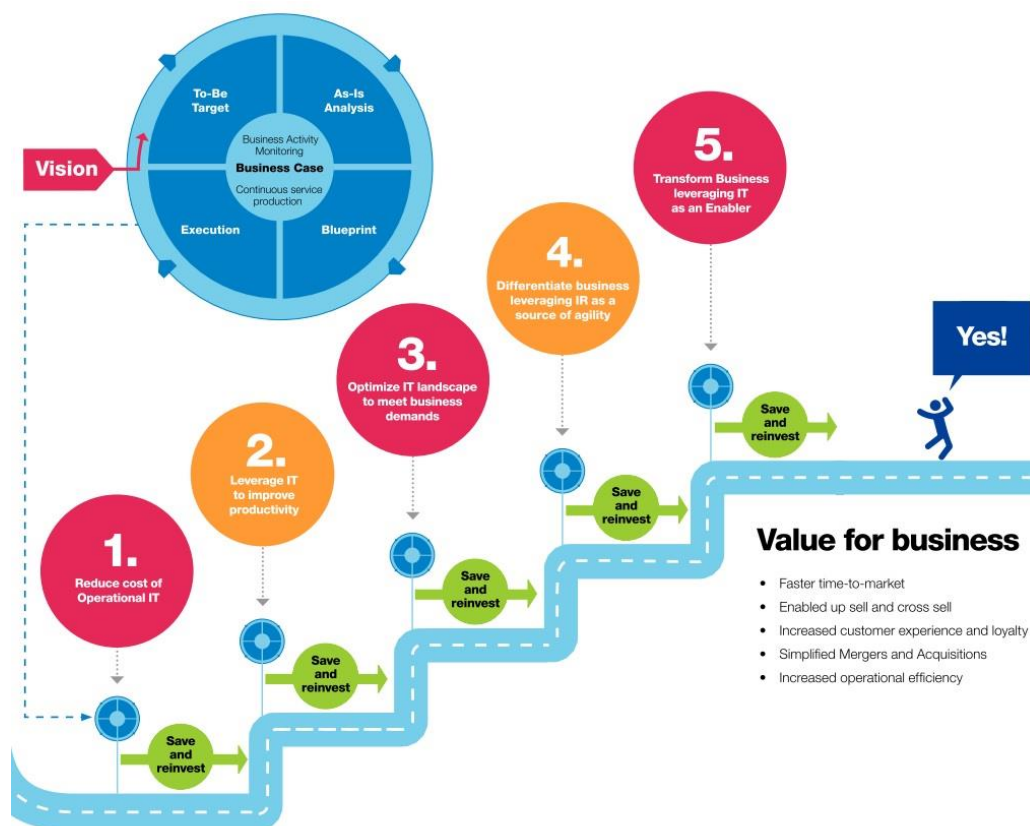


Figure 6. Tieto Transformation Model (Tieto 2017)

### *IT transformation model by VMware*

VMware (2014) is approaching the transformation in three steps but the main structure is the same as in Tieto's approach (see Figure 7). Main target is to break the traditional silos and move towards more functional, service-focused operating model based on the IT-as-a-Service (ITaaS) framework. In this approach, it depends on the corporate maturity where the actual IT transformation begins due to model itself only guide to assess the maturity and leads to ITaaS operating model. (Lo 2014)

The first phase is usually the starting point for most of the organization where IT has already consolidated and virtualized most of the services improving the cost efficiency and IT productivity. In the second phase, the actual IT transformation begins for some of the companies when more automation is implemented to achieve faster business productivity and new management tools are introduced to improve reliability and quality of service. The third phase is the ultimate goal where IT becomes a service broker acting according ITaaS model. As a service broker IT will be able increase the agility and cost efficiency to the next level by utilizing more end-user services and reducing operational costs by using new scalable technologies and different sourcing strategy. (Lo 2014)

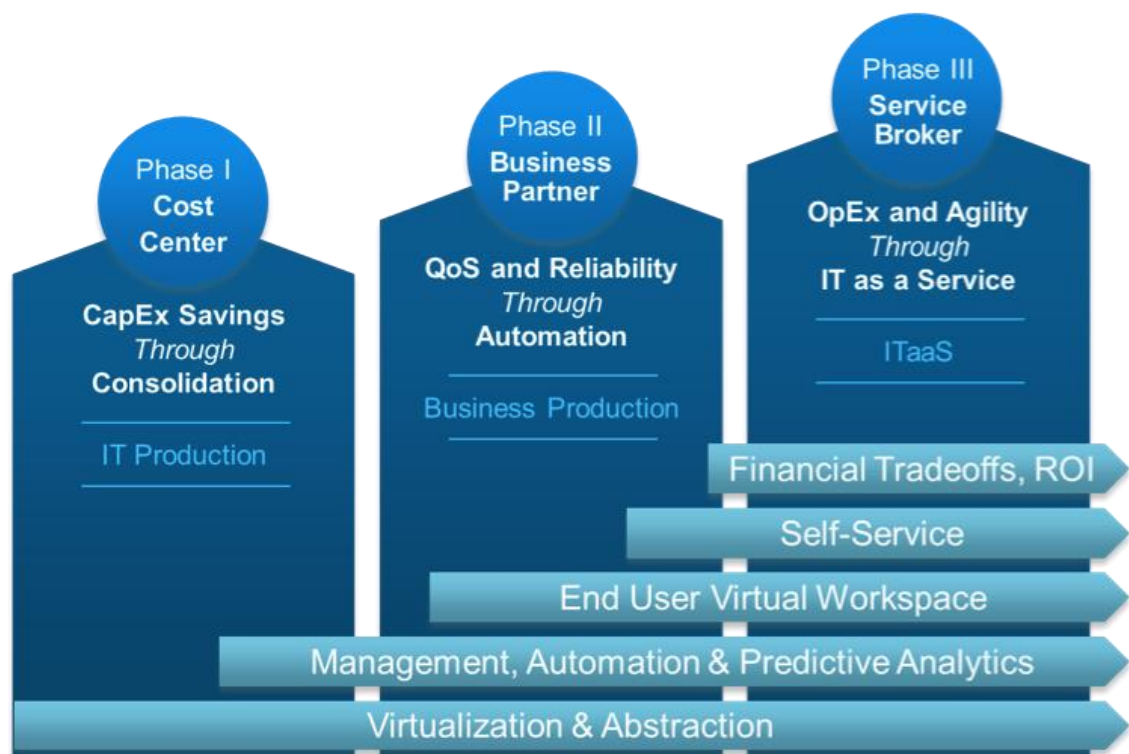


Figure 7. IT Transformation path (Lo 2014)

All this cannot be enabled just with technology and as mentioned earlier this model target to the ITaaS operating model requires a completely new way of thinking, organizing people differently and many changes to the processes. The change begins from the process-oriented organization which is usually still the state for many companies build around traditional IT Service Management (ITSM) and tools. Drawback of this model is that even though the processes are managed everything works still in technology silos. The second step is to move service-oriented model where IT is focusing service management and more customer focused outcome. In this model IT services, applications and infrastructure can be already linked to business outcome and services has been defined and they are managed. The third model is to 'run IT like a business' where costs transparency is in the middle and business pay IT based on the usage. Relationship between the IT and business is managed in similar way as the customer relationships. All these three steps lead to ITaaS operating model which is described in more details in next sections. It is good to understand that company does not have to go through these different phases if the ITaaS model deployment is planned in orderly manner. This change from the culture and IT management point of view is illustrated below in Figure 8. (Lo 2014)

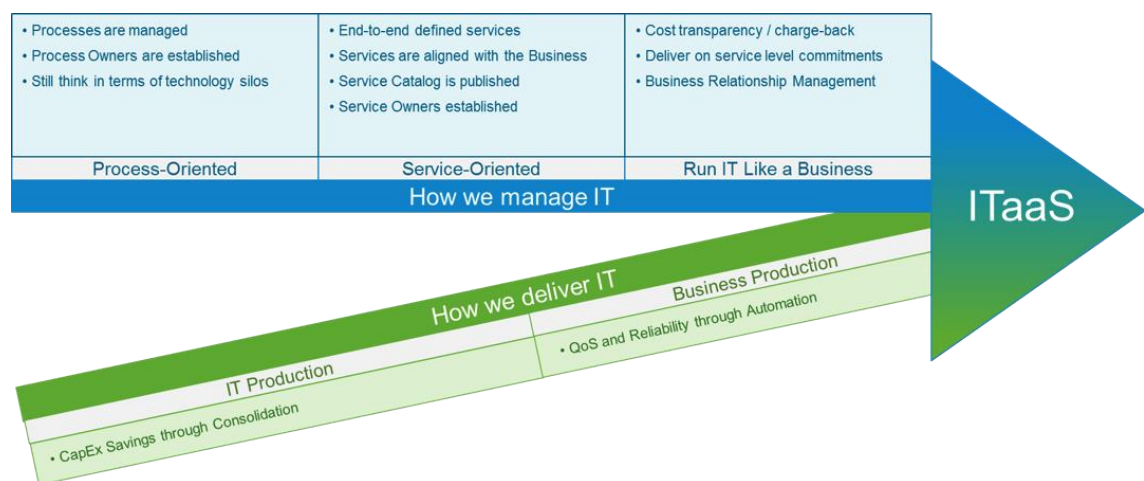


Figure 8. ITaaS culture change (Lo 2014)

Delivery of the IT usually happens in steps before the actual ITaaS transformation. The first step is to increase IT production and make savings via consolidations and optimization. The second step is to increase business production and improve quality and reliability of the service with automation.

### 3.2 IT operating Model for IT Transformation

IT transformation is usually built around a certain model of IT operations. After research, it seems that almost every IT operating model used by companies in IT transformations is based on the same reference architecture. This operating model is usually referred to as IT-as-a-Service (ITaaS) or IT4IT which is based on the Open Group IT4IT reference architecture. The target of the Open Group (500+ member organizations) is to identify, analyze and present existing and new requirements and build policies and best practices around them. (OpenGroup 2017)

Originally operating model has been defined in the corporate strategy literature, describing how the organization should operate to deliver services for the customer and how to meet the strategy of the company. Nowadays operating model can apply to certain organization or unit only but still the main idea is the same that it targets to align daily operations with the strategy so it can be measured. (De Vries et al. 2011: 1005), (Brown et al. 2008: 310)

Reasons for a need to change the IT operating model during the IT transformation are many but one of the main drivers has been the cloud services which have become common for many company. Not so many years ago there was no good definition available how cloud based services should be operated but now it starts to be hard to find a common definition for it. Luckily it seems that even though there are variations most of them are based on the IT4IT framework as mention earlier.

Research focus of the IT operating model in this thesis is purely on IT transformation and based on the material available and using external consultancy. The primary areas to be investigated further are service (processes), finance, organization (people) and technology which are part of the ITaaS operating model. Figure 9 below describes the main idea of the ITaaS IT operating model.

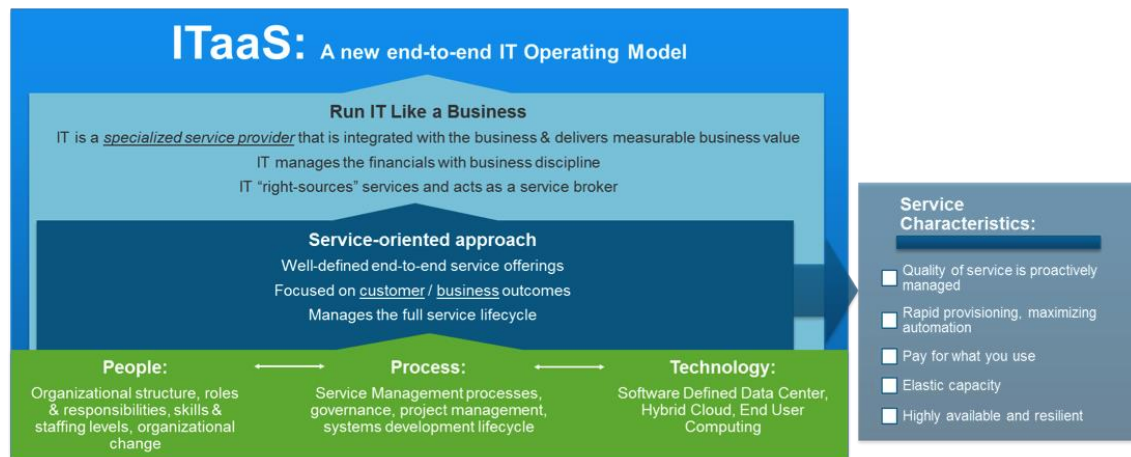


Figure 9. ITaaS IT Operating Model (Lo 2014)

The main idea in the above approach is to run IT like a business and actually providing business value. All the services should be well oriented and focusing on customer and business outcomes. This model is studied in detail in the following Section 3.4.1 (ITaaS – IT operating model for cloud based operations).

### 3.2.1 ITaaS introduction - IT Operating Model for Cloud Based Operations

IT transformation is usually built around cloud transformation which is the main reason why the IT operating model must change as well. IBM (2017) summarized the reasons for the new operating model in the following way:

*"In the age of digital transformation and hybrid cloud, business expectations for seamless, personalized, always-on service run high. Technological advances such as cognitive capabilities and automation are blurring business distinctions and empowering competitors to emerge from any industry and geography. Staying ahead requires a willingness to change course and embrace constant reinvention.*

*As the technology engine powering the business, IT must innovate with new technologies and find new mechanisms and business models for creating value and driving growth. The truth is, IT organizations have an enormous opportunity to transform the enterprise by moving to a new operating model. That model is IT as a Service (ITaaS)." (IBM 2017)*

With cloud platforms IT can provide a wide range of services easily and fast but due to these services are usually coming from various locations, this kind of hybrid cloud environment starts to generate challenges for the IT. Problems may raise from the integrations, management and security and soon IT organization ends-up to situation that cloud computing will require as much if not more time to run, than the legacy environments. (IBM 2017), (EMC 2012)

The ITaaS operating model enables IT organizations to optimize the value of the cloud services and makes it possible to get everything out from the new emerging technologies. With the new operating model IT service consumption and management will be simplified and IT will be transformed to broker that is capable to standardize incoherent, multivendor infrastructure by integrating platforms and utilizing orchestration technology. This allows services to run in the desired location while maintaining the control and visibility. (IBM 2017), (EMC 2012)

### 3.2.2 Services Transformation

Based on available materials and the ITaaS framework, IT should become a service broker which is ran like a business. IT needs to act as an internal service provider that basically can provide any service that business requires and IT needs to be fully integrated with the business delivering business value that can be measured. IT service costs should be managed together with business but IT is the broker who does the sourcing and manage the costs. The whole service offering should be automated as much as possible and provided as end-to-end service. The ITaaS operating model and the overall service lifecycle management is based on service management best practices but it is designed for the cloud based services (XaaS).

*“XaaS are characterized by the quality of service being actively managed, services being rapidly provisioned (typically through automation), ability to pay for what you use, elastic capacity, and high availability and resiliency. While service management encourages these characteristics, achieving these characteristics across all IT services is a goal of ITaaS.”* (Lo 2014)

### Services position in ITaaS

Standardized, modular and multisourced services will be in the center of all the operations that are provided to the business by the IT as a broker. The business does not need to think about where to get required services when the IT is able to support all kind of

requests and is not limited to any specific technologies, services or service providers. However, the IT role as a broker is to act as a voice of sense by simplifying and unifying the services offering, making smart sourcing and controlling the services utilization. Position of the services in ITaaS operating model is illustrated in Figure 10. (IBM 2017)

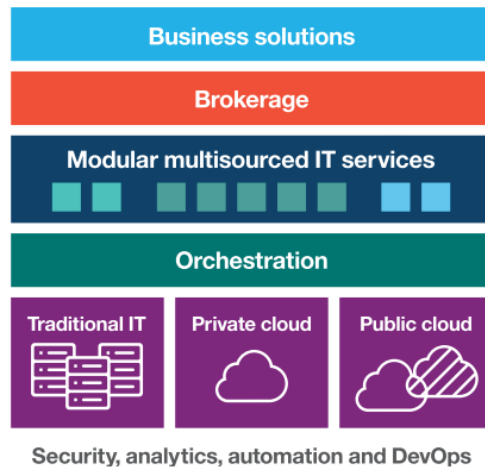


Figure 10. IT as a Service framework (IBM 2017)

The top most level of the framework is business solutions which are dependent of development services. DevOps practices are part of the ITaaS and should be implemented to increase agility, efficiency and automation of the development services and eventually improve business solutions. (IBM 2017)

#### *Orchestration and asset management*

Orchestration is a technology service that enables management and control of numerous services regardless of their location and offers automated end-user services. Maintaining the services offering, self-service catalogue offering and assets in various clouds will be challenging. IT needs to be able to upkeep offering continuously for the business based on their requirements. This includes new providers' evaluations and onboardings, benchmarking services and selecting the right choices for the business. Everything needs to be automated end-to-end to make sure that everything stays standardized and corporate IT security is met. (IBM 2017)

Orchestration plays a key role with the integrations due to it will connect the services together automatically, hence it will bring many requirements for the IT transformation. It will have an impact to the support processes, organization and technologies. Application Programming Interface (API) technology must be introduced to make the integrations as



easy as possible and software-defined technologies needs to be taken into use to increase automation. (IBM 2017)

#### *Value based services*

IT service portfolio should be created in a way that each service brings value to the business and that needs to be visible by link to the business metrics. Benefits of this is that, IT can talk the same language with the business and instead of focusing to the IT costs and service levels, IT can discuss about business outcomes. Cost management credence alone does not demonstrate the business value therefore this is a very important and will lead to a chance to get more budget when discussing with the business. (Gartner 2012)

Below Figure 11 by Gartner (2012) illustrates how the IT services contribution can be linked to the business outcomes.

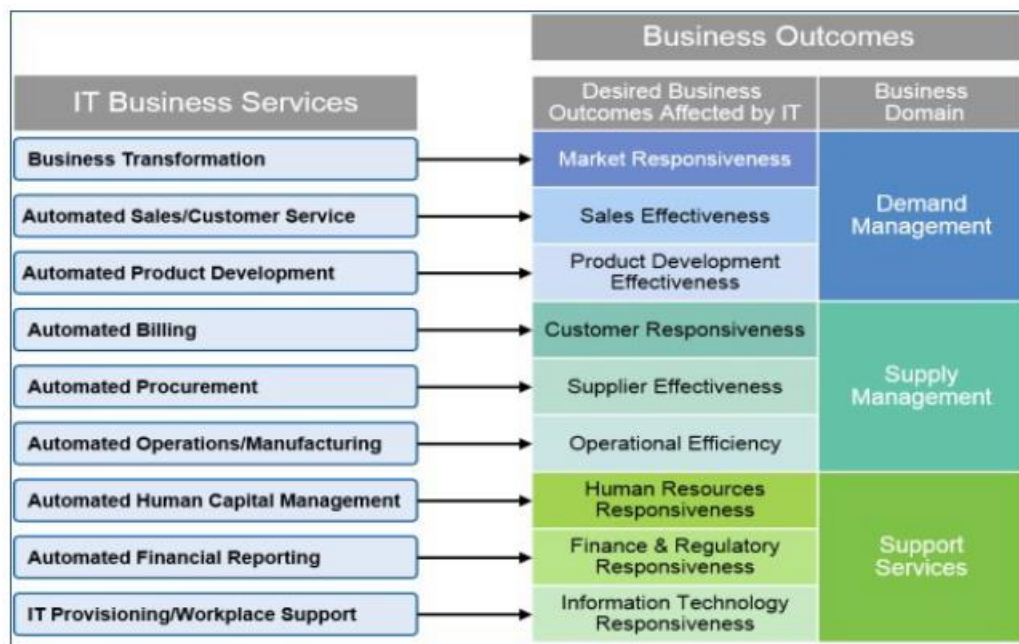


Figure 11. Focus to business optimization example by Gartner (2012)

Often it is thought that creating a service portfolio is enough but it is equally important to demonstrate the value each service bring to the business. This needs to be done by linking each service to business metrics contributing to improvement of a business outcome as in the above example. (Gartner 2012)



### 3.2.3 Finance Transformation

IT organization must have a visibility to externally hosted cloud services due to it ensures that everything is procured in agreed manner and following security. With ITaaS there is a way to automatically identify cloud assets that have been purchased outside of the corporate controls and bring them under same management with rest of the IT. Cloud services can be viewed and monitored by the IT management and usage, deployment location, costs and security can be managed on the same console. Benefits for the business are that incident resolution will be faster and IT is able to offer improved service levels (SLA). This allows that business can still (if they need or want) use existing cloud services but purchasing will be centralized and all the processes will be unified to achieve compliance with rest of the IT.

By controlling which cloud services are preferred and using automation for the provisioning so that business can order services by themselves without risking the corporate rules, security or resilience. They can also control the costs by self-managing capacity and service levels. With transparent costs and billing model ITaaS will provide visibility directly to the business so that they can make a comparison and decision against their business case before the actual provisioning. By implementing chargeback model IT can steer business to avoid unnecessary costs by helping them to use correct services, monitor consumption and changing the services if needed. (IBM 2017)

“Transparency builds trust and lowers risk, making it easier to verify that service levels are being met and to maintain alignment with business goals. It’s easier for business users to see the value of going through IT for services instead of using external providers.” (IBM 2017)

#### *Cost management and transparency*

Cost efficiency and cost transparency is seen one of the most important steps in business and IT transformation. According Gartner (2012) successful business transformation requires costs and value transparency.

*“To be successful with digital business transformation and optimization, CIOs and IT leaders must communicate the financial story of IT using mature budgeting practices enabled by actionable financial transparency.”*  
(Gartner 2012)

Cost transparency and cost management is definitely one of the key elements in every IT transformation. It is recommended to compare own organization IT budget to other industry and help to transform the future IT costs to meet business expectations better. Gartner has a tool for this but it requires Gartner account before it can be used so only public samples has been in used in this research.

To achieve cost and value transparency Gartner (2012) have created a practice with five key principles which are accountability, agility, transparency, discipline and simplicity. Target of the practice to spending is aligned with business services. This practice is illustrated in Figure 12.

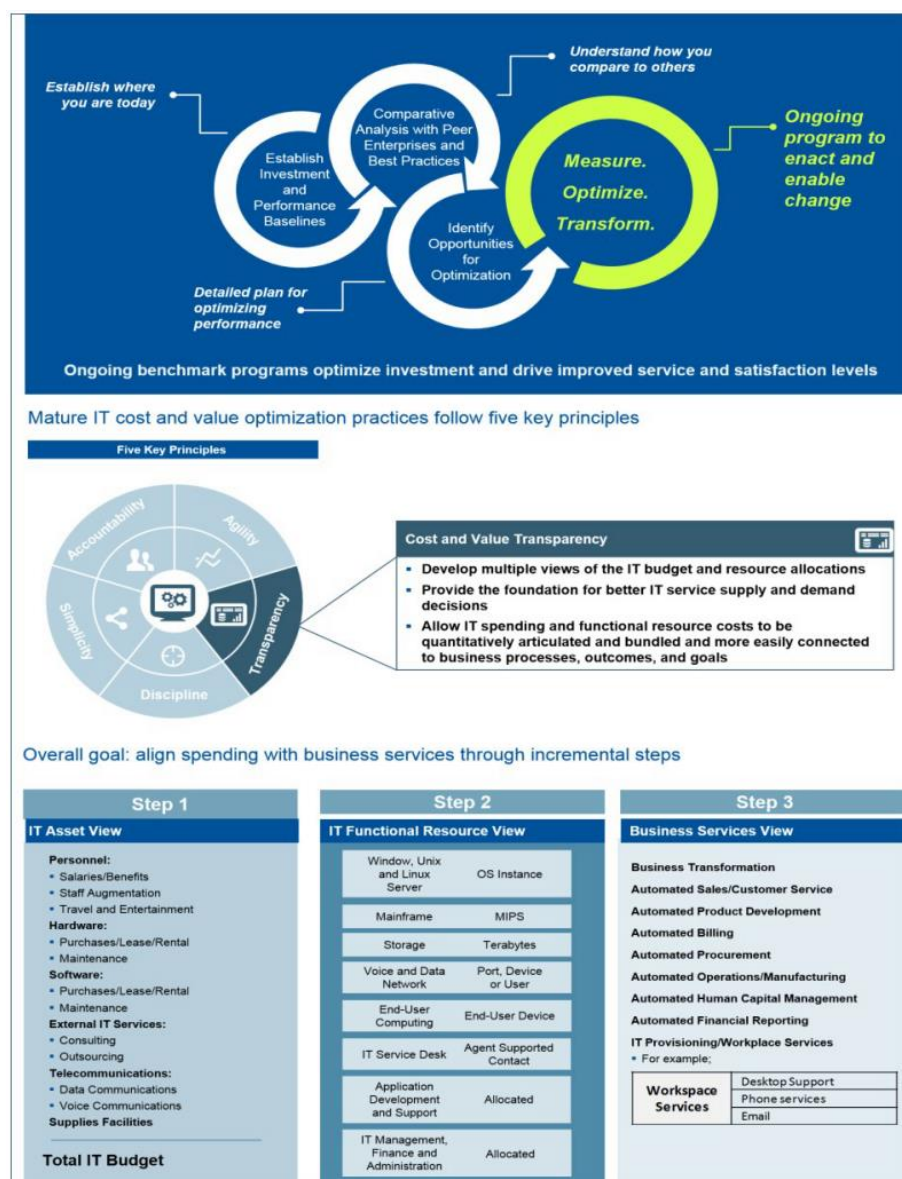


Figure 12. Gartner IT cost and value optimization practices (Gartner 2012)

One of the main targets in IT transformation is to achieve better ability to support business more cost efficiently with increased value. Gartner (2012) has made a framework which illustrates business value for IT investments and help decision making. The framework is linking IT costs to running the business, growing the business and transforming the business. This decision process is illustrated in Figure 13. (Gartner 2012)

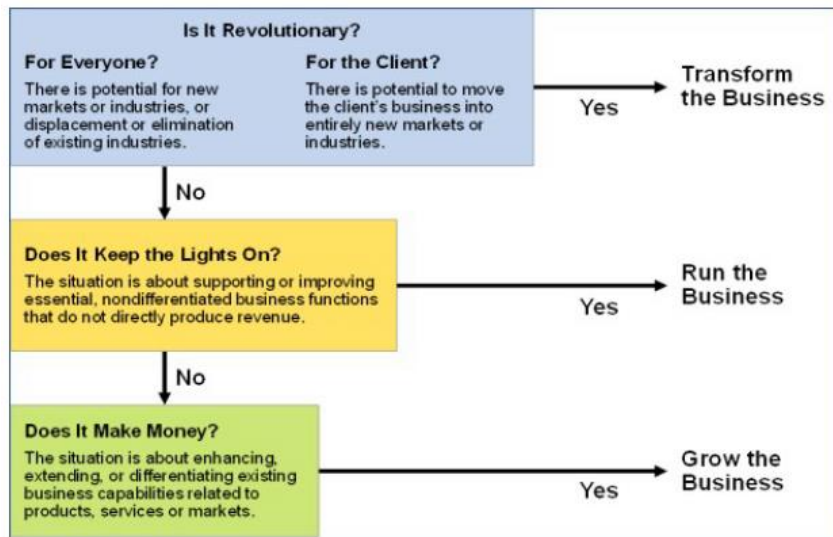


Figure 13. Strategic IT Spending: Decision Tree (Gartner 2012)

When the business is changing and IT needs to follow it is crucial to understand where the money goes. According the Gartner (2012) strategic IT spending categories are running the business, growing the business and transforming the business. For the companies whose run costs are high it is common that they are not expecting or planning big changes in their business. Below Figure 14 shows how the spend is distributed between the categories in average.

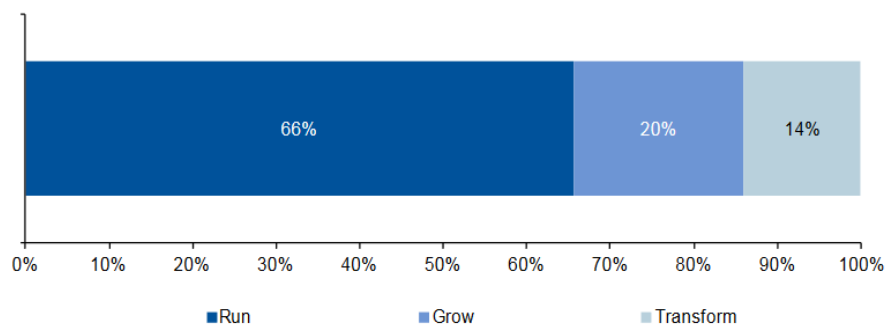


Figure 14. IT spending per category by Gartner (2012)

It is important also to understand what belongs under which category. A common error is to mark IT initiatives that may transform the IT organization (like virtualization) under “transform the business” category when those should be put under “run the business” because it only affects the existing IT infrastructure. “IT transformation often leads to new business process improvements that enable the business to grow or build new revenue streams” Gartner (2012). These kind of transformation costs should be evaluated and shared based on IT service and business performance. All these three categories should be discussed in business terms and reflected to the ways how IT can make business more successful. To understand better how the categories work Gartner (2012) have defined them in the following way:

*“Run the business: This is an indicator of how much of the IT resource is consumed and focused on the continuing operation of the business. It includes all nondiscretionary expenses as part of the run-the-business cost.” (Gartner 2012)*

*“Grow the business: This is an indicator of how much of the IT resource is consumed and focused on developing and enhancing IT systems in support of business growth (typically organic growth). Discretionary investments are more likely to be included in the grow-the-business or transform-the-business cost.” (Gartner 2012)*

*“Transform the business: This is an indicator of how much of the IT resource is consumed and focused on implementing technology systems that enable the enterprise to enact new business models. This is very much a “venture” category and would be represented by activities such as a brick-and-mortar retailer moving to online shopping; a traditional bank offering online banking (or moving into offering insurance services); or a commercial airline offering new freight services.” (Gartner 2012)*

The trend in IT is to reduce 3<sup>rd</sup> party and outsourced costs and spend less money in IT when growing the business. This can be achieved by increasing automation which reduces the need to manage the assets and using more dynamically scalable IT capacity reduces the need to spend more money when the business is growing. (Gartner 2012)

### 3.2.4 *Organization Transformation*

Based on the research, the ITaaS operating model is most commonly used in IT transformations instead of ITIL practices. This research does not dive deep into the operational processes or how those should be developed but rather states that along with the ITaaS all the operational processes might require a change. The main processes that will be affected will be Service Level Management (SLA), Capacity Management and Change Management. Service asset management and configuration asset management have been identified also to require special attention due to it is one of the processes which is poorly managed at the moment. It is safe to state that assessment of all the processes and making sure that those will be aligned with the new model of operations must be part of the IT transformation.

Benefits of ITaaS compared to ITSM are that it provides a complete framework to assist simplifying the overall IT management value chain. It offers dynamic governance by automating business, operating and security policies and practices. Service management and DevOps required controls are also introduces which would otherwise be missing from the cloud based platforms when moving to the production. [IBM 2017] Main organization changes requires are defined in the earlier sections.

#### *Organization structure*

The organization structure means a group of people and agreement how activities like task allocation, coordination, supervision, responsibilities, reporting are organized to achieve company targets (Pugh 1990). When using cloud services and applying the ITaaS model IT organization must change as well due to role of the IT will change. IT acting as a cloud service broker and business using various amount of different cloud services from different vendors requires that IT focuses on optimizing the services for the business usage and outcomes. IT will become responsible for the service performance but also for the profit. [IBM 2017]

Cloud services eventually require that IT will gain new skills and focus more to the customer and business. This will require that new roles like business relationship management will be introduced. In addition to new service roles, supporting processes and responsibilities needs to be established which will then lead to clear ownerships and accountability. (Cisco 2013)

According to Oredo (2014) the following challenges with cloud services can be used to identify new required competences; a) availability and reliability of the cloud services, b) security and privacy concerns, c) portability, interoperability, integration with legacy system, d) vendor management, e) cultural resistance to changes in the organization, f) transition and execution activities with cloud services. (Oredo et al. 2014: 154,155). During the IT transformation, the whole IT organization will be affected. (Anderson and Gtantz 2012: 6,7). Based on these sources there is a need to establish a new IT organization or at least be ready to make multiple changes if the IT transformation is planned.

### *Governance*

In general, governance in corporate environment can be defined as corporate governance and IT governance which is a subset of the corporate governance. The corporate governance defines all the processes, policies and practices used to control and manage the whole organization. This thesis is about IT transformation and will concentrate only to the IT governance. (ITIL Glossary 2011), (Brisebois et al. 2007: 31)

### *IT governance*

IT governance plays a significant role in the IT transformation but also in the overall corporate governance. IT should be aligned with real business needs because critical business processes are often automated and IT is an important part of the successful business performance, competitiveness and delivery. Focus from IT being only for internal customers is shifting to direction how IT can make money and add value to the business strategy. All this put pressure on operative IT management. (NCC 2005)

*“The current climate of cost reduction and budget restriction has resulted in new norm – there is an expectation that IT resources should always be used as efficiently as possible and that steps are taken to organise these IT resources ready for the next cycle of growth and new IT developments. A key aspect of these factors is the increasing use of third party service providers and the need to manage these suppliers properly to avoid costly and damaging service failures.” (NCC 2005)*

UK's National Computing Centre best practices for the IT governance includes the following twelve key topics which should be considered when planning a governance (NCC 2005) See Table 8:

Table 8. Key IT governance topics (NCC 2005)

<b>Key IT governance Topics</b>	<b>Target</b>
The business case	The organization needs to understand the value proposition
Performance measurement	Is the ship “on course”?
Implementation roadmap	How to start – What path to follow
Communications	How to explain the objectives and change the culture
Capability assessment	Finding out the true current state of IT governance
Risk management	What risks exist and how to make sure they are dealt with
Supplier governance	External parties play a big role and must be included
IT and audit working together	How to co-operate for a common goal
Information security	A key topic in today’s networked environment
Legal and regulatory aspects	Compliance is a global concern
Architectures	The foundation for effective technical solutions
Managing investments	Ensuring value is delivered and benefits realized

IT governance goes through the culture, organization, policies and practices that helps management and control of the IT. UK’s National Computing Centre defines the following five main areas for the IT governance (NCC 2005) See Table 9:

Table 9. Main IT governance areas (NCC 2005)

<b>Main IT governance Areas</b>	<b>Target</b>
Alignment	Provide for strategic direction of IT and the alignment of IT and the business with respect to services and projects.
Value Delivery	Confirm that the IT/Business organisation is designed to drive maximum business value from IT. Oversee the delivery of value by IT to the business, and assess ROI.
Risk Management	Ascertain that processes are in place to ensure that risks have been adequately managed. Include assessment of the risk aspects of IT investments.
Resource Management	Provide high-level direction for sourcing and use of IT resources. Oversee the aggregate funding of IT at enterprise level. Ensure there is an adequate IT business

	requirements, capability and infrastructure to support current and expected future
Performance Measurement	Verify strategic compliance, i.e. achievement of strategic IT objectives. Review the measurement of IT performance and the contribution of IT to the business (i.e. delivery of promised business value).

Alignment between IT and business in every way as possible is seen important. Delivering something without measuring and making sure that it provides value should be avoided. Without a risk management, the business and IT investments are in great danger. With business guidance IT should meet the requirements by offering adequate infrastructure for the business and manage the spending. The last governance area is performance measurement which is the most important because without this nobody knows if the IT performing well enough against the defined business values.

### 3.2.5 *Technology Transformation*

Technology transformation is most probably the first step on the overall IT transformation journey. This usually means starting use of the cloud services and migrating existing IT infrastructure to private cloud, public cloud or hybrid cloud and utilizing more SaaS (Software as a Service) services. This thesis does not focus on comparing different cloud technologies on a detailed level or try to answer which cloud technology would be the most suitable for the case company. This IT transformation research and proposal is based on known facts that the case company IT infrastructure requires hybrid cloud infrastructure but most of the services can be run in the public cloud environment. Based on that, this section concentrates on identifying the key technology transformation elements and best practices for the IT transformation.

#### *Cloud transformation*

IBM (2017) has conducted a global survey of 500 IT decision makers. According the results 70 percent of them see that they will use hybrid cloud in the future because there will be always some traditional IT infrastructure in addition to the cloud services. Common truth is that cloud services usage will increase but still there are many legacy core systems that are not compatible with a cloud. (IBM 2017)



The market study shows that companies able to manage their hybrid infrastructure in integrated and unified way keeping the visibility and control benefit most from the cloud. Agility and flexibility benefits are gained more likely by using automated orchestration for provisioning and configuration of cloud assets. Platform resiliency, security and regulatory requirements are also met most likely by these companies. (IBM 2017)

#### *Cloud asset management*

Increasing use of cloud services from various vendors requires much more attention from the IT to oversight everything. This is getting more and more difficult due to number of used cloud services in every company is increasing rapidly. According to the Netskope (2017) report “manufacturing leads the way with the highest average amount of cloud services used with 1,370” (Netskope 2017). IT is usually aware only small portion of all the used cloud services due to many of these services are free to use, business is purchasing them directly and there are no existing control or monitoring in place. The missing visibility and diverse governance makes it difficult to create seamless delivery and cost control is harder due to scattered infrastructure causing also security risks.

(IBM 2017)

The end-users’ expectations and behavior have changed because they have become more global, mobile and social. People are used to self-services where they can make the choices themselves and now they are demanding it in the corporate environment as well. To avoid a risk that internal IT is bypassed by external providers, corporate IT must be able to provide infrastructure and applications as a service, customized and on demand basis. Self-service automation is one of the key elements for the asset management. [IBM 2017]

To summarize technology transformation the IT transformation starts from the cloud. Hybrid cloud strategy is the recommended option for the companies having existing IT infrastructure due to it makes possible to keep the workload in the optimal location with optimal cost and security. Cloud asset management requires special attention and new tools for monitoring and control. Cloud assets in use should be identified in the very beginning of IT transformation.

### 3.3 Asset Management

According ISO 55000 An asset is an item, thing or entity that has potential or actual value to an organization. (Assetmanagementstandards 2017)

The purpose of asset management is to find, identify and list assets and make that information available and valuable for the whole organization supporting life cycle management process and support strategic decision making of the ICT landscape. Asset management provides also insight to decision making when making hardware and software purchases. (Snyder 2010)

Included in this responsibility are development and maintenance of policies, standards, processes, systems and measurements. These enable the companies to manage the ICT asset portfolio with respect to risk, cost, control, IT Governance, compliance and business performance objectives as established by the business. (Snyder 201)

The asset management involves the balancing of costs, opportunities and risks against the desired performance of assets, to achieve the company objectives. Additionally, it makes possible the analytical approach towards managing an asset over the different stages of its life cycle starting from the conception of the need for the asset, through to its disposal, and includes the managing of any potential post disposal liabilities.

The asset Management is combination of making the right decisions and optimizing the delivery of value. The main objective for the service is to minimize the whole life cost of assets but not compromising the business continuity nor forgetting any risk factors.

#### 3.3.1 *Software Asset Management (SAM)*

Software assets life cycle management is a set of processes, activities, and tasks to be applied during the life cycle of a software version. The processes include planning and testing, packaging and installation, inventory and utilization as well as software retirement. The software life cycle management shown in Figure 15 illustrates all the phases in the software asset management. (Deloitte 2014)

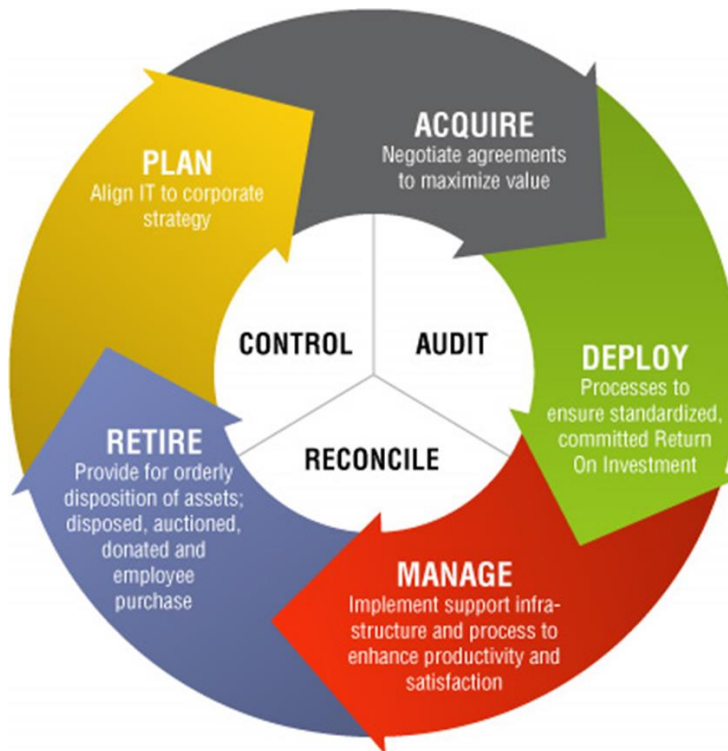


Figure 15. Software life cycle management (Rasquela 2015)

The most important thing in life-cycle management is that the overall process is continuous. All the software assets need to be controlled, audited and reconciled. When planning to purchase a new software it is important that it is aligned with the company strategy. All the agreements need to be negotiated to get best possible discounts and benefits from global agreements. Deployment process is important that it is automated and there is a control to everything that has been deployed. Management phase of the life-cycle ensures that the usage is optimized and everything is compliant against license rules. Last phase in the life-cycle process is retirement. This step includes software exit process when the employee leaves the company or when the PC is changed. Retirement process will also take care of versioning and software removals completely from the IT environment.

Enterprises are facing increasingly challenging goals and priorities with tighten budgets in today's rather complex hybrid IT environments. Tracking licenses is difficult and are more and more time consuming. License compliance and audits are a reality, which can lead to unbudgeted license costs and resource allocations. For Enterprises to be able to gain control of software assets to save costs and to optimize the value from the software investment, they need a robust SAM strategy, including good processes, licensing expertise, and real-time software inventory and recognition tools in place. (Rasquela 2015)

Gartner (2017) defines SAM as a framework and set of processes that allows organizations to strategically control and manage the financial, physical, licensing and contractual aspects of software assets throughout their life cycle. The goal of SAM is to gain control of software assets and reduce compliance risks as well as to save costs within corporation.

### *Tools*

Software Asset Management process will not work without proper technology and tools. Now a days there are tools in the market which will provide a lot of different functionalities in a single package but in order to fully support the process there is a need to utilize a set of tools and technologies.

SAM tools are designed to reduce the risk, cost and complexity associated with software assets and licensing. With correct tool companies can avoid costs by not over provisioning and ensuring compliancy with licensing rules. Tools can provide centralized view of all software and hardware assets, license information and application usage metrics, effective license positions, software license expenditure and trend analysis, usage of deployed assets and makes it possible to create rules for approved and unapproved software. [Snow Software 2017]

“The basic premise of forming an ELP involves comparing your entitlements with your deployments. Establishing an effective license position means taking full inventory of software assets and comparing them against license documentation & installations. This allows your organization to see where it may be over- or under-licensed, presenting opportunities for improvements in license compliance.” (Vector 2017)

### *SAM Service*

Software Asset Management tools alone will not manage software assets. Dedicated and experienced license and compliance specialists who understand the complex publisher’s terms and conditions and agreements as well as how to optimize licensing based on corporate license usage data and user access profiles are needed to reach the SAM goals.

Based on the discussions with other companies there is a need for a SAM license manager whose role is to maintain agreement and license information in the SAM tool. SAM

license manager provides license compliance reports for agreed software vendors and presents and analyses the findings in regular meetings. The goal is to qualify the license compliance status and optimize license usage and license costs effectively as well as identify possible risks. SAM License Manager also take part in the software lifecycle process, request fulfillment, purchasing process, vendor relationship management, portfolio management, software deployment, release and change management, asset identification, inventory management, software asset control and retirement process.

This knowledge and experience should be procured as a service from a 3rd party vendor since the case company lack such skills and resources internally.

## 4 IT Transformation Preparations and Proposal Creation

This chapter argues IT transformation and evaluates the different steps of IT transformation preparations, leading to a proposal for the case company. The current state analysis of the case company IT operations (Section 0) defines the drivers and main targets for the IT transformation and this section concentrates on evaluating and choosing the building blocks for the actual IT transformation proposal. Transformation evaluation consists from the following two main phases described below.

1. IT transformation content and structure for the case company is evaluated based on the case study results, research work and best practices, IT and business requirements, IT transformation workshops' findings, stakeholder interview results and benchmarking other companies.
2. Evaluation of 3<sup>rd</sup> party consultancy to assess the current IT landscape and consultancy help to assist with the IT transformation proposal planning and preparations.
3. Evaluation of the IT asset management.

All above phases are evaluated and explained in the following sections and the IT transformation proposal is presented at the end of Section 4.

### 4.1 IT transformation Preparations

Based on the company strategy and current state analysis presented in Section 2, the main focus in the IT transformation must be on cloud transformation and increasing agility and then making necessary changes to the IT operating model.

The evaluation of the IT Transformation in this thesis means going through different approaches to perform IT transformation and ITaaS operating model implementation based on the available material of best practices and measuring them against business requirements and then selecting the most suitable parts to be used in the IT transformation proposal for the case company. To support this evaluation 3<sup>rd</sup> party consultancy was used to assess the current IT landscape and help with the IT transformation proposal.

There is no definitive way to implement the ITaaS model, so the following approach for the IT transformation proposal creation has been taken; ITaaS operating model will be used as a guideline to define required changes in the current operating model but systematic ITaaS deployment will not be done before the actual IT transformation and IT

operations requires it. The main structure of the ITaaS operating model is used to categorize the requirements into actionable items which can be used in the final IT transformation proposal. The structure consists of services transformation, financial transformation, organization transformation and technology transformation. These four categories are evaluated in the following sections.

#### *4.1.1 Evaluation of Services Transformation*

The business must be able to get value based service offering with choice of options and service levels and all the services should focus to outcome-based performance that is measured against business goals. Based on everything that has been learned during the study it leads to the statement that services transformation must be built around cloud transformation. This means that public cloud readiness must be implemented, public cloud service provider must be selected and cloud operator for cloud services must be chosen. To manage all this, it is mandatory that a new IT service will be established in the case company to take the ownership of the cloud services. Proposal for the IT transformation is to have a new IT service for 'Global Cloud Services'. IT in overall, need to start acting as a 'service broker' providing the following broker services for the business:

- Cloud service intermediation broker services, providing value added services on top of existing cloud platforms. These services can be such as identity or access management capabilities.
- Aggregation broker services bringing together multiple services and ensuring the interoperability and security of data between systems.
- Cloud service arbitrage services providing flexibility and options to choose from by offering multiple similar services.

As the proposal will be to use more and more cloud services and business will be demanding more, it will be necessary to evaluate all the IT services and check if they are still valid in the future and if there are any changes needed in the service to meet up the new business requirements. Service portfolio needs to be re-thought so that it does not contain any more individual service components but complete services end-to-end.

Especially all the application services running in the 'legacy' environment must be assessed and cloud transformation plan to be created for all the services that can be migrated to the public cloud. Those services that cannot be migrated to the public cloud, must be re-evaluated and decided what will be future strategy for them.

The following approach will be taken to transform application services to exploit cloud solutions, deliver superior customer experience and accelerate business outcomes:

- Advise - Assess - Plan
- Transform - Execute - Integrate
- Manage – Optimize - Innovate

### *Cloud suitability mapping*

The following process (see Figure 16) was created to be used to make the assessment phase of the application cloud transformation.

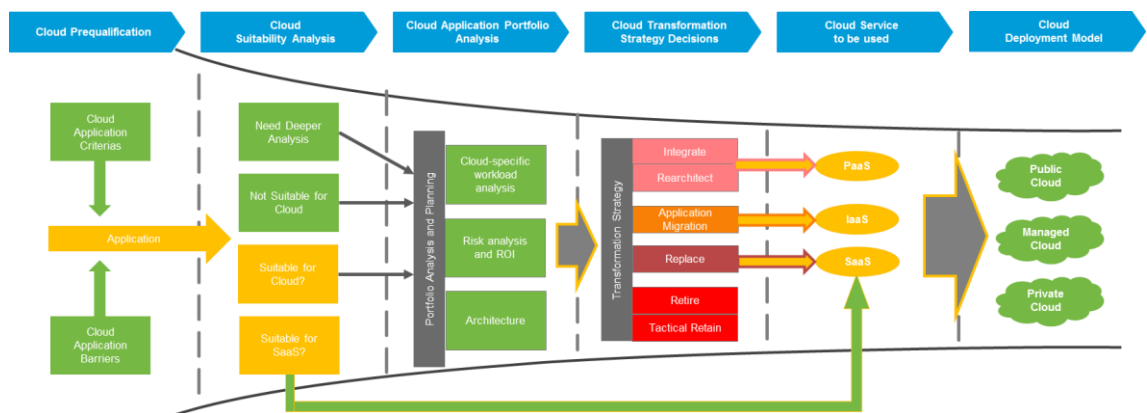


Figure 16. Cloud Suitability mapping

Suitability mapping starts with doing a pre-qualification for the application against cloud application criteria's (publicly known) and known barriers. After that application will be checked if it is suitable for SaaS or cloud and if not then it requires deeper analysis or it will be tagged as a not suitable for cloud. Next the overall application portfolio needs to be created for the cloud applications and applications will be analyzed and planned for the next steps which lead to one of the sixth different transformation strategy options. These options are replacing the application with SaaS service, migrating to cloud or moving to PaaS platform either via integration or rearchitecting the application. Last two options are retiring the application or making a tactical retain. Last step is to define if the IaaS load will be in public cloud, managed cloud or private cloud. These transformation strategy options are explained in more detail below;



- It is important to note that through replacement transformation method it is possible to transform services currently not suitable for cloud to ones which are suitable for cloud. The replace transformation method replaces existing applications either by other applications or by SaaS services. During a replacement, data migration and integration are key components and careful planning is an absolute requirement for success. When replacing an application housekeeping should be done on primary data and delete old items or archive them for regulatory and compliance reasons.
- The application migration transformation method is primarily affecting underlying infrastructure without changing applications or application architecture so it is one of the easiest methods. Re-architecting requires always case by case study.
- Sometimes the cost savings or other benefits resulting from changing a service or service offering are too small to justify the investment required to make the change, or the change itself would cause incidental costs which outweigh the benefits of the change. In these cases, the best alternative is to do nothing and make a tactical retain decision and keep the service as it is. A compelling event such as a change in business or the need to overhaul the underlying platform, for example because the hardware or operating system has gone out of vendor support, should trigger a re-analysis of the available options and a new decision on what to do must be made based on the changed circumstances.
- The last transformation method addresses applications that are at the end of their lifecycle. In the case of retire, the data might have to be archived to address regulatory requirements.

#### *Support Services – Cloud operator*

Currently the case company's core applications are in a managed hosting environment and if the services are migrated to the public cloud there is a need for a new service provider who would be taking care of cloud services as cloud operator. As part of the research work, Request for Proposal (RFP) material was prepared ready for the IT transformation. These materials are strictly confidential and cannot be share but it consists of the following documents:

- Invitation letter telling about the opportunity itself, proposal submitting instructions, selection criteria and contact information.
- Annex 1 which defines the services in the scope split to core services, additional services and optional services.

- Annex 2 which contains questions for the vendors; general questions about vendor, competences for the services in the scope, pricing models for each service and service levels.
- Additional material including additional scope information and details about incident management, change management and non-cloud services that are also part of the RFP.

Even though the case company has a global support model it is not working perfectly and it is not completely ready for wider cloud services adoption. All the support services e.g. service desk must be aligned with all the planned changes and trained for the new services. During the research three topics were identified that will require IT transformation attention.

The first service that must be implemented is a predictive support. As stated earlier, more self-services will be implemented and required but the setback with end-user self-services are that they tend to manipulate IT costs by exporting support costs back to the IT user. This generally does not result in improved productivity of the workforce, because the time users spend solving their IT problems, is time taken away from productive work. With predictive support productivity issues could be prevented before they occur by analyzing data from devices, knowledge on how issues build and how they are solved.

The second topic identified is related to the service desk system is the utilization of the system by different entities to support their workflows. This creates an unnecessary coupling and will limit development speed. A single customer interface with a single service catalog can be provided without providing all services through a single workflow system.

The third topic related to service desk is related to ticket count which is higher than benchmarked companies are having and major part of the incidents and service requests are not even logged in to the system. Deeper analysis is needed to detect the reasons.

#### *Service Level, Performance and user experience*

Service level management will change when moving to the cloud services due to there will be eventually multiple vendors and considerable number of different services. Keeping the performance and user experience on excellent will be challenging even though cloud services should provide that out of the box. The case company application landscape is known to be very heavy and requiring a lot from the underlying infrastructure.

Due to this monitoring and performance measurement services will be even more important role in the future due to it needs to be able to scale to all the services regardless where the application is hosted. These requirements need to be assessed in the IT transformation.

### *Asset management and Automated Services*

Services transformation should focus also to the automated self-services that are aligned with the business requirements. By offering more automated self-services IT will be able to put more focus to the other important topics that are explained in the following sections. Key automated services that has been identified that needs to be in the scope are:

- Test automation services for all the core applications supporting DevOps.
- Automated server and database provisioning and change management with self-service for the application teams.
- Automated application provisioning with self-service for the end-users.
- Automated development processes with development platform.
- Cloud services orchestration.
- Self-healing incident remediation.
- IT service request fulfillment workflow automation.
- Application release automation.
- Disaster recovery.
- Automation based on predictive analytics.

For all this, IT should build a unified service portal (orchestration) which would be providing a single interface for all the business and IT services (even though there would not be automation behind all the services).

Asset management plays a key role in the IT transformation and so for it is evaluated in a separate topic in the following sections.

### *Taxonomy and service catalogue*

During the research, it was identified that the current taxonomy requires enhancements. In the current structure application typically describes 'Service offering' where 'Service' is an end-to-end IT service that delivers value to customers. The service combines people, processes, and technology to provide outputs or results that enable business capabilities or an end user's work activities and desired outcomes. Service offering is a specific technology-centric activity or product used to deliver a service. The current mapping

is inconsistent; in some cases; 'Service offerings' are categorized as 'Services' and vice versa. In addition to this, 'Services' are typically grouped logically utilizing a 'Service Category' tier (Figure 17).

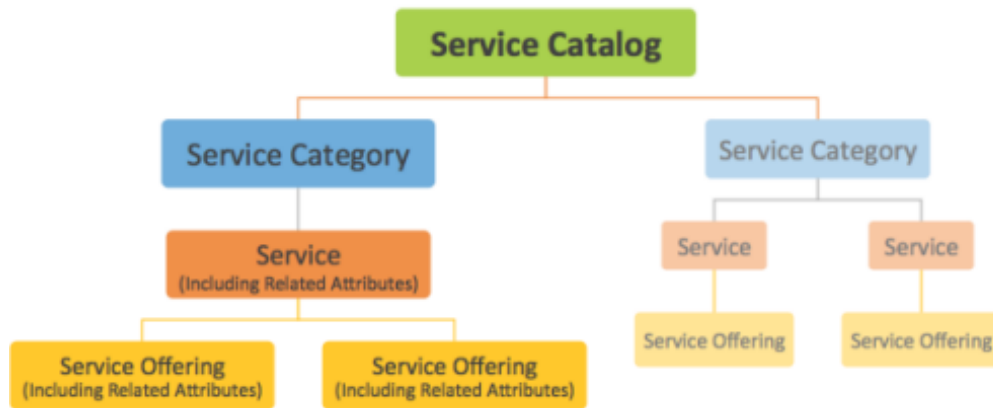


Figure 17. Service catalogue structure

The target should be to create logical grouping of services which benefit from being managed together. These high-level groupings should be meaningful to facilitate budgeting and governance of services in the future. The target service catalog should include only a small number of service categories due to smaller number will be easier for end users to navigate and more effective for IT to manage.

#### 4.1.2 Evaluation of Finance Transformation

As stated in the previous section cloud transformation will be leading the services transformation and so it will play a key role also in the finance transformation. One of the financial impacts in cloud transformation is that it is expected to save money. To prove this and to be able to make a business case for the IT transformation, research project ordered a work from external company to assess the core IT landscape and make recommendations based on that. The IT landscape project calculated a business case for the cloud transformation and savings are significant but business case itself is strictly confidential and cannot be shared. The summary of the assessment is shared in Section 4.2.1.

Based on the feedback regarding the existing costs management, model that would be preferred is consumption based billing (by hour). This would allow optimizing the costs by shutting down environments that are not needed all the time (training, test, development, QA) and the provision and de-provision of the virtual servers with fast cycles does not generate extra costs. Cost efficiency will be one of the main drivers for the cloud transformation.

Cost transparency is something that is requested by most of the teams, due to it makes forecasting easier and reduces financial surprises. Cost transparency is also important when moving to the cloud based services because without proper visibility and control the costs can exceed the existing costs due to easiness to order services that can scale dynamically. Best way to control costs is to provide full costs transparency to the unit that uses the services and implement internal chargeback model for end-to-end costs. Based on the feedback and analysis of the current environment, one of the key requirement is to have a working asset management service and cost transparency. Software asset management is evaluated separately in Section 4.3.

Right sourcing was also brought up multiple times, meaning that the case company should have a global sourcing model which is utilized to source always in most feasible way on global scale. Utilization of most cost-efficient infrastructure and vendor that meets the requirement should be a standard policy. The following requirements were set for sourcing:

- Vendor locks should be avoided as much as possible.
- Pay as you go billing model should be always demanded.
- Infrastructure must be always bought separately from the service.
- Contracts must be renegotiable with reasonable terms.
- Contracts termination notice time should not be longer than three months from the case company side.

#### *Capacity and performance management*

Based on the research, lack of information and sparseness is an issue in the case company's IT landscape. Resource utilization or efficiency is poor on several layers and accurate utilization information is generally not available for decision making. To confirm this assumption and to provide actionable intelligence on the situation, Cloud Optimizer software was installed to analyze the IT landscape managed by a 3<sup>rd</sup> party in a managed

cloud. Cloud Optimizer analyzed workloads and the infrastructure utilized for running workloads to provide insight into infrastructure, virtualization layer and virtualized workloads.

Based on the results approximately 60% of the virtual machines which run workloads have too many vCPUs assigned. This causes additional costs in the form of hardware capacity and licenses. Almost 100% of virtual machines have too much memory allocated in proportion to the workload. VM activity metric suggests that more than 75% of the VMs running workloads are idle, meaning they do not execute any actions related to the workloads they are built for.

High idle percentage of servers reported by Cloud Optimizer and historical data on server sizing shows that the case company use of existing infrastructure has been declining. Current server capacity has undergone already one right-sizing round from the original sizing; it was heavily down-sized based on analysis done earlier. According to Cloud Optimizer data, more down-sizing could still be done.

Currently all such activities require human effort in analysis, decision making and implementation. Implementing IT automation would likely enhance the speed of adaptation to load levels. In its simplest form automation could control single server resource allocation making sure it meets the demand. This would be a small, incremental development step providing some cost saving opportunities on infrastructure, especially when not factoring in the effort required for building the required automation.

To summarize, an important part of the IT transformation will be consolidating and optimizing the workload which cannot be migrated to the public cloud where dynamic scalability is available. After those assets have been identified, automation to manage the workload should be implemented even though it would be hosted in private cloud.

#### *4.1.3 Evaluation of Organization Transformation*

Organization transformation focuses on key elements that need to be part of the IT transformation along with the overall IT governance and organizational change. The ITaaS operating model introduced in Section 3.2.1 will play the key role in the organization transfer due to it is the most commonly used and recommended model for the companies planning a complete IT transformation.

The company management has stated that the case company IT does not operate based on the global mode, and thus IT is not reaching its full potential. This means that in IT transformation, IT need to first make an assessment which covers globally the governance model, policies and processes and then unify them and start operating globally with same rules. In parallel possibilities to implement more dynamic governance model by automating the business, operating and security policies and practices should be investigated.

#### *Organization structure*

In the service transformation evaluation (Section 4.1.1) it was already stated that there is a need for two new IT services which will transform the organization structure. These services are Global Cloud Services and Configuration and Asset Management Service. This will have impact to the current roles, tasks and responsibilities and requires IT management involvement from the very beginning of the IT transformation.

#### *Workload and time optimization*

A topic that was raising in individual interviews, multiple workshops and even in the case company's employee surveys is that there is too much workload and it is not managed well enough. In practice, this means that people have too much things ongoing at the same time and there is no time to take care of all the required tasks. Especially this has a significant impact to the service development and interaction with the business.

Targets for the workload and time management should be to free IT resources time from ad-hoc maintenance and operations tasks and sift the focus on development, serving business and customers. This is seen number one factor to increase job satisfaction inside the IT. Utilizing internal resource more for global operations and development is seen the most viable way to start workload and time optimization but also basic administration tasks outsourcing would be needed. Knowledge transfer, sharing and tasks rotation are seen important as well.

#### *Agility*

Agility is something that everyone would like to see increased because in the case company server provisioning, capacity and change management is taking too much time. Some of the slowness is due to non-working request and approval processes but mostly it is due to lack of automation. Even though everyone would like to see faster response and execution times for their requests, agility is not seen the most important requirement

by most of the teams. Reasons for that are that the operations that most of the teams are running does not require constant capacity management, dynamic capacity nor new provisioning very often. These teams' application environments are also often very customized causing that even though the platform would be ready the actual application cannot be provisioned automatically at the moment. Development unit creating digital services for the customers is the only unit that will benefit most from the faster operations. With agility comes also some setbacks and in this case, it means that in order to achieve the agility persons needs to learn new skill to manage assets in cloud by themselves. This means that they need to have also time for the management. This is one of the biggest cultural changes in the case company and will require close attention.

### *Governance*

The overall governance model should be re-build around the business needs and processes. IT transformation should initiate a discussion with the business organization what this means in practice and what are the practical next steps for IT to help business to improve their performance, competitiveness and delivery agility. All the IT governance topics and areas introduced in the Section 3.2.4 IT governance part should be re-visited during the IT transformation.

#### *4.1.4 Evaluation of Technology Transformation*

Technology transformation evaluation focuses on cloud transformation and existing infrastructure modernization, consolidation and automation.

### *Cloud transformation*

According to the business feedback using cloud services is inevitable, therefore the case company should start global cloud transformation and migrate all the possible assets to the public cloud if possible and build all the new assets directly in the cloud. Drivers for cloud transformation include improvements in cost optimization, agility, self-service capabilities and overall service transparency. The condition for the cloud transformation for each asset separately is that the change of the hosting location is not allowed to decrease availability of services excluding a small maintenance break during the migration of services. The performance of the service after migration must be at least on same level as it is now. It is already known that certain application environment cannot be migrated to the public cloud due to performance issues which will bring certain integration requirements between the on-premises infrastructure and the cloud services.



An IT Landscape project was ordered from a 3<sup>rd</sup> party to make a cloud suitability assessment for the core services (Section 4.2.1) and according to the analysis, there are only a few services where Cloud service is not an option. It is important to notice that this does not mean automatically that everything reported could be migrated to the cloud but all that needs to be proven by testing before the production environments can be migrated.

The analysis covered many cloud service types (SaaS, IaaS, PaaS, CaaS) and deployment models (Public, Private, Managed). It can be said though that the current case company IT landscape is suitable for cloud that are of IaaS type and primarily have a private or managed deployment model. Most of the landscape is also currently deployed in an IaaS type of cloud but there are also areas where SaaS type is valid. Two of the analyzed services are in practice close to platform services (PaaS) because they enable application services to be executed on top of them. Those services need deeper analysis on the service object level (for example the actual application processes running in the platform).

One of the example objects mentioned above is 'Lotus', where it was found that approximately 1 000 applications, primarily providing document and content management services as well as IPR and HR services are hosted. This will have an enormous impact on the IT transformation due this kind of legacy environment will require multiple transformations and a far more detailed analysis of service lifecycle is required to create a complete roadmap.

#### *Cloud provider*

Cloud provider selection divides opinions but a general feedback is that for the public cloud services it should be either Microsoft Azure or Amazon Web Services and between those there is not much difference from the infrastructure perspective. However, the cloud provider selection will be one of the key targets in the beginning of the IT transformation and milestone for further actions on path of cloud transformation. Cloud providers need to be further investigated to get a holistic view of different options available, synergies to the existing infrastructure need to be evaluated, to be cost structure calculated and compared between the vendors and finally the preferred cloud vendor selected unless multi-cloud strategy is a reasonable option. The IT transformation project should also pilot the selected or multiple public cloud providers.

### *Cloud operator*

The case company has been managing most of the IT infrastructure with internal resources but when moving towards cloud services there is a need for the cloud operator who could help with cloud asset management mainly due to two reasons, there are not yet internal skills to manage it and current resources are overloaded which indicates that outsourcing this part of the IT infrastructure on some level would make sense. Cloud operator selections will be the second mile stone after the cloud provider is selected before the actual transformation can be started. Cloud operator selection requires official Request for Proposal (RFP) process lead by the case company IT sourcing unit and the material prepared for it briefly introduced in Section 4.1.1.

### *Cloud management*

One of the concerns seen when moving to cloud based infrastructure is its management. To fully benefit from the lower costs structure, flexibility and swiftness of cloud infrastructure, applications teams must be able to do certain things by themselves. This cause concerns because the application teams have not managed the infrastructure earlier so one condition for the cloud transformation is that application teams are willing to manage certain cloud infrastructure elements by themselves. Corporate IT services should concentrate on service management and architecture, platform management should be outsourced to a cloud operator. Operational tools for the cloud service management should be available for the applications teams that they can utilize cloud infrastructure automation capabilities for easy deployment of the servers and applications, as well as the capabilities for configuration, orchestration and reporting of the cloud IT infrastructure. The application teams will have the responsibility of the resource and cost management in the future, therefore advanced reporting with forecast information must be made available.

### *Performance and user experience*

Introducing any new services, platforms or solutions usually requires that existing user experience and performance of the solution will not be negatively affected. Public cloud services and SaaS services provide high availability but because environments cannot be customized as much as earlier and location of the services cannot be freely selected, it may have an impact to the performance due to several reasons. The cloud platform itself will provide high performance for most of the use cases but network connectivity

and location of the cloud provider's data center will have the biggest impact on the performance. New services must be tested from the end-user locations to verify if the performance is on acceptable level.

The following factors needs to be identified and investigated because they will affect network performance: latency and latency requirements, available bandwidth and bandwidth requirements, routing from end-user location to the cloud service, traffic acceleration possibilities, medium to be used (private connection or VPN over Internet).

### *Latency*

Latency is the most challenging factor of all due to it exists always due to physics. Amount of latency depends on the distance between the source and destination and distance is dependent of the routing. The enterprise cloud services are usually located in single location due to live replication between different data centers globally is not supported by most of the enterprise applications. This will lead to situation that latencies might be very high when using the services from another side of the world. If the usage of the service is global it is very important to check what are the maximum latency requirements of the application.

### *Bandwidth*

Enterprise applications tend to require more bandwidth than applications normally which will affect the decision of media to be used. With private line connectivity available bandwidths are higher and available bandwidth can be guaranteed which is not the case when using Internet. All the bandwidth requirements are not known due to that has not been an issue earlier in the existing environment so this was raised as a concern by many of the people discussed.

### *Routing*

Routing will be critical with the cloud services due to services will be spread to multiple vendors to multiple locations in the world and access method might vary between private lines, VPN over Internet and direct connectivity over the Internet. The case company infrastructure team is concerned how the routing can be done in most optimal way so that it also works. They also raise an issue that current network topology might not support cloud transformation automatically so network architecture assessment is mandatory for the transformation.

### *Traffic acceleration*

With traffic acceleration devices and using Content Delivery Networks (CDN) it is possible to optimize traffic and make unusable service usable again. Need for this and its importance was raised in many discussions and needs to be investigated.

### *Media*

Connectivity to the cloud services can be done mainly in three different ways, private line connection, VPN over Internet or direct access from Internet. Private line connectivity (MPLS) is more reliable due to it is using operators dedicated network which they can control and manage. Benefits of the private line connections are reliability, different service levels available, static latency and guaranteed bandwidth. However private line is more expensive and it requires that services is accessed always through certain route. VPN over Internet is as secure as the private line but due to it is using public Internet for carrying the traffic there is no guarantee for the service level, bandwidth, routing or latency. VPN is easier and cheaper to take into use which makes it popular now a days. The third option is to access services directly over Internet using encrypted connections. This is the less secure option but done in a correct way it is also an option but unfortunately not for all type of services. From the cost point of view the last option is the best one but there are more things that needs to be considered before taking it in to use especially in corporate environment. Performance of the direct Internet connection might be also fastest in certain cases due to it allows easy traffic acceleration and all the users can access the services with most direct route from anywhere, if they just have an Internet connection available. The case company does not have any restrictions to use all these options if the application architecture supports the connectivity and it does not compromise the security. Few of the applications were identified to require very low latency which might prevent using cloud as an option completely and most of the applications do not support direct Internet connectivity so recommendation is to use either private line or VPN over Internet. Starting with VPN is easier and cheaper which makes it most feasible option to start with.

### *Location*

The preferred location of the service provider is in Europe because the existing main data center is in Finland and most of the users are in EMEA region. However, almost everyone agrees that there are issues already with the existing services so location selection must be done carefully and tested before moving to the production.

### *Modernization and consolidation*

The case company has a lot of infrastructure upkeep debt that require replacements and updates unless that infrastructure is modernized and consolidated. In more than fifty sites there is some sort of local IT infrastructure (storage solutions, backup solutions, servers, network devices, local applications) that is not centrally managed, inventoried nor up to date. There is a high potential to centralize and automate services, and utilize more cloud based services due to legacy infrastructure is not anymore serving the purpose. Unmanaged capacity means no warranty and no service level agreement which is a risk for business continuity. Unpredicted CAPEX investments are emerging by surprise due to missing common strategy and roadmap.

Wider adoption of global services is also needed and local services needs to be centralized to main locations or migrated to the cloud environment if the performance allows it. One infrastructure element that gets a lot attention is local storage devices and network drives. Replacing local storage and backup solutions with global data architecture and solution should be part of the IT transformation based on the feedback.

The target is to keep local infrastructure as minimum as possible and simplify, redesign, consolidate, combine and utilize hyper convergence infrastructure when cloud services are not an option. New infrastructure requires much less management which will also help with the workload issues. Before making any plans or actions for the legacy infrastructure the whole infrastructure must be known. This brings dependency to the asset management which is missing. The first target for the modernization and consolidation of legacy infrastructure is to build up an asset management system and asses the whole IT landscape (operations, applications and infrastructure).

### *VDI*

During the interviews one system owner brought up challenges related to upgrades. It seemed that upgrade cycles are long due to the effort needed, and as result of it, users of the service must find workarounds to known issues as fixes cannot be deployed fast enough. The issue seemed to be related to client software deployment (CAD application). Another system owner brought up the same challenge, with his application the issue was the effort needed for testing an update. Both of these issues have a solution. The former may require advanced VDI or a new software packaging and delivery approach, the latter needs testing and lifecycle automation or a complete overhaul of the system itself.

### *Overlapping solutions*

Likely due to past mergers and acquisitions, there are services which have overlapping solutions in use, in addition to those solutions which are in maintenance mode waiting to be retired. Overlap will certainly cause losses when negotiating volume discounts on software licensing and will require more investments into competence as well as multiple application integrations and the daily service delivery. All these needs to be identified and plans to replace duplicates needs to be made.

## **4.2 3rd Party Consultancy**

To make sure that the IT transformation plan and proposal is executable, 3<sup>rd</sup> party consultancy was purchased. Basically, three different consultancies were used during the research; meetings and workshops with different vendors to get insights to emerging technologies, IT landscape assessment by 3<sup>rd</sup> party and another 3<sup>rd</sup> party consultancy to plan and prepare the IT transformation proposal.

The company used for the IT transformation planning and preparations was selected from multiple 3rd party cloud and IT transformation consulting companies. The case company wanted to have a small enough company to help with the planning to gain agility and flexible service. After initial shortlisting, two finalists were met multiple times to hear their cloud transformation consultancy offering and to discuss the case company's requirements. The case company wanted to have a dedicated cloud architect who could continue with cloud transformation if the overall IT transformation proposal would be approved. Both finalists offered their best candidates who were interviewed before the final selection between the companies were made.

### *4.2.1 IT Landscape Assessment*

IT landscape assessment was ordered from the 3<sup>rd</sup> party to analyze workloads, those meaning applications or systems from the service delivery location point of view. Assessment primary focus was to analyze whether each application is deployed on the best platform weighed against its cost, performance, security, regulatory compliance, and other criteria. The assessment details cannot be shared due to confidentiality but the basic details and findings has been summarized below.

The work was carried in three phases; definition, analyze and powering the findings. These three steps are explained and results are summarized below.

*Definition*

To define the best location for the applications, each application in production inventory was analyzed to find out where that application would best be deployed based on the following:

- Cost to migrate.
- Cost to operate.
- Performance requirements.
- Security, confidentiality.
- Availability and reliability.
- Corporate IT standards.
- Regulatory requirements.
- Geo-political requirements.
- Contractual terms and conditions.

Knowing the answer to these requirements for an application determined the ideal deployment location.

Information gathering for the analysis was conducted through interviews. Two questionnaires were used to collect information about services. The first questionnaire focused on service details; service descriptions, service roadmaps and service infrastructure. These topics were discussed to form an understanding of service content and usage as well as service lifecycle to detect events that which could potentially change the result of the analysis. The second questionnaire focused on cost to migrate, performance requirements, security, confidentiality, availability and reliability, corporate IT, regulatory and geo-political requirements as well as contractual terms and conditions as for example in license terms and contracts, or and support contracts. The outcome of the analysis was summarized in a Total Cost of Ownership (TCO) excel, illustrating the savings potential from workload adjustments.

### Analyze

Each application in the production inventory in the scope was analyzed using top-down analysis with the following steps:

1. Analyze Cloud suitability.
2. Analyze Application specifics to have baseline for transformation.
3. Suggest transformation strategy.

The overall process used is described in Section 4.1.1.

Based on the assessment most of the services in the scope of the assessment are suitable to the cloud but it is good to remember that this is based on the information gathering and real feasibility for each of the service needs to be proven by testing the migration during the IT transformation planning phase. Cloud suitability amounts are listed in Table 11.

Table 10. Cloud Suitability Report

<b>Service Cloud Suitability</b>	<b>Amount</b>
Suitable for Cloud	66 / 80
Suitable for SaaS	11 / 80
Requires more investigation	2 / 80
Not suitable	1 / 80

The next step in the analysis was to go into application specifics to form a cost baseline for on ongoing services and a baseline for deployment. This was a bottom-up analysis on the existing environment and on cost efficiencies there. Analysis considered where current workloads could be hosted (based on set criteria) and would there be a business case to make such a transformation. Analysis emphasizes mid-term benefits over short term benefits and emphasizes wider optimization instead of point solutions; re-hosting an application in another IaaS when a SaaS service is available is at least effort wasted from performing through analysis on how to replace traditional, IaaS built solution with a SaaS offering.

There are plenty of short term benefits reachable by doing house-keeping and focusing on retiring unused, underutilized services and capacity. Big, transformational benefits bring innovative ways of working and change the landscape considerably. Such moves



require focused effort, but also provide benefits and savings far greater than those achieved by simply moving servers around. One of such identified topics is robotic process automation which could provide 50 % improvements on efficiency in end-to-end process and provide endless scalability with controllable cost.

#### *Powering the findings with IT transformation*

The following topics were identified to be important for the IT transformation during the assessment. Optimizing the offering and choosing the correct hosting options IT will be able to deliver effective administration of hybrid infrastructure, workload migration, applications, data, users, compliance, and security. Users should be able to seamlessly access the full complement of hybrid infrastructure resources specific to their job requirements. A service catalog should present to each audience (QA, developers, testers) only the cloud and traditional IT resources which are appropriate and approved for their function. IT organizations need to offer private and public cloud services that appear uniform to the business, including the APIs that drive the services. Service catalogs should present all options and differences between services in an easy to understand manner. Systems administrators must be able to easily manage existing traditional IT resources as well as private and public cloud resources from a single pane of glass. They also need a way to virtually move assets (infrastructure components such as hardware and licenses) from the traditional environment to the private cloud as capacity consumption shifts from traditional to cloud. Optimizing the IT landscape should include the security, governance, and compliance required by applications and enterprise. It should regulate workloads and user access, provide on-demand provisioning of applications and workloads, and optimize resources across a complex open hybrid infrastructure. The resulting benefits are lowered costs, reduced risks, and greater productivity for the entire organization.

### **4.3 Evaluation of Software Asset Management**

Due to IT transformation being highly dependent on working software asset management (SAM) service and the case company is missing that service, there is a need to request for proposals for the software asset management tools and services, pilot the SAM solution and establish a new IT service - configuration and asset management service. The sections below evaluate the requirements for the service and reviews the requested proposals for the tools and service providers.

#### *4.3.1 Service Asset and Configuration Management Process*

At the very heart of efficient IT Service Management (ITSM) lies the Service Asset and Configuration Management (SACM) process which needs to be implemented for the new service during the IT transformation. The purpose of SACM is to ensure assets required to deliver services are properly controlled and with that control make sure that there are no changes outside the agreed change process. Process will ensure also that accurate and reliable information about assets is available when needed and it helps to manage the full lifecycle of IT and service assets, from the point of acquisition through to disposal.

The configuration management part of SACM could provide a logical configuration model of the services, assets and infrastructure by recording relationships between assets and configuration items. Without SACM is it very difficult to understand, for example, service specific costs and at the moment for the case company it is difficult or sometimes even impossible to optimize the situation when the knowledge on assets required in delivering a service is not available. One-time efforts require also extensive data gathering and it is not always possible to monitor outcomes of any implemented changes.

Currently there are no common data model and most of the relationships are not present. Also, information about service portfolio and service structure and the underlying infrastructure data is not centrally available. Without a configuration management system, it is difficult to see, how fundamental IT service delivery processes like incident, problem and change management could run efficiently. Configuration management process and system needs to be in the scope of the IT transformation.

#### *Knowledge management*

In discussions, the state of documentation has been brought up and it was stated that the document inventory is not up to date and likely the content may suffer from similar problems. Having documents just for the sake of it (i.e. to cross off an item in a project plan) is not the point. Accurate and up-to-date documentation is required for operational efficiency and quality. For service desk, documentation provides the knowledge required for support task closure, which at the same time in most of the cases means restored productivity for the business facing problems. Up to date knowledge is also required when setting up self-service tools for the business to enable them to troubleshoot and rectify issues by themselves.

The case company is starting an analysis of document inventory and that analysis would benefit from actual service life cycle state information by avoiding needlessly analyzing services which are being ramped down, undergoing upgrades or being otherwise transformed. This information could be provided with working SACM so it should be part of the IT transformation.

#### *4.3.2 Software Asset Management Service Model Selection*

Evaluation of the software asset management was done for three different categories which each contained multiple options. Advantages and disadvantages of these options for each category were compared and measured against the case company requirements. Requirements were defined for each of the category separately based on the study of best practices and the case company internal assessment results and shortlisting.

These categories of the evaluation are software asset management service model, software asset management tools and service providers. Options for the software asset management service are; outsourced, internally managed and hybrid. For the software asset management tools and service provider evaluation, the case company selected three different tools and service providers based on the case company's internal assessment and shortlisting.

##### *Outsourced service model*

The first option for the software asset management service model is outsourced deployment model. Outsourced model is a full software asset management service including tools, processes and the service for the whole software life-cycle.

##### *Internally managed service model*

The second option for the Software Asset Management Service is internally managed deployment model. The whole software asset management service and asset management life-cycle is fully managed internally using own tools which are also managed internally.

##### *Hybrid service model*

The third option for the Software Asset Management Service is hybrid deployment model. Hybrid model is a model where the service management of the software asset

management is performed internally and some parts of the service and software asset management life-cycle is outsourced to 3<sup>rd</sup> party.

#### *Service model selection*

The case company does not have much existing competence for this new service and service needs to be started up in phases with reasonable costs the only feasible service model to start with is a hybrid model which means that the service will be managed internally but some parts of the service is outsourced and consultancy can be bought separately. Requirements for the software asset management service should include the following in the list below;

- Procurement process integration with asset management.
- Licensing expertise for cost optimization, budgeting, enlightened procurement and risk management.
- All license agreements centrally managed and full procurement data visibility.
- Software and license scenario, strategic & roadmap planning.
- Monitoring, reporting, analysing and advising.
- All licenses and agreements, historical and new purchases, orders, true-ups are added to the SAM-tool.
- License compliance reports and analysis provided on a regular basis.
- Software life-cycle planning through system reports and day to day operations support.

#### *4.3.3 Software Asset Management Service Provider Selection*

Requirements for the software asset management service providers are based on the service requirements introduced in the previous section and the main evaluation criteria are;

- Cost efficiency.
- Flexibility.
- Meeting contractual requirements.
- Modularity of the service offering.
- References.
- Not bundled with tool.
- Piloting of the service.

The evaluation of each category options was done by using weighted scoring comparison model and based on the results presented in the Appendix 2. Based on the evaluation the service provider two should be selected and will be proposed.

#### *4.3.4 Software Asset Management Tool Selection*

The selected software asset management tool needs to be able to support service requirements introduced in the previous sections. As seen in Appendix 3, the selection among the three software asset management tools is based on the combination of 15 different evaluation criteria and requirements.

Three different tools were selected for the software asset management tool candidates based on the internal shortlisting which was based on availability of the tools in Finnish market (resellers), service availability in Finland, tool popularity and other smaller factors. These three tools were evaluated against the case company requirements for the software asset management requirements. The evaluation results of the tools are combined to show the comparison of the tools and to select the best suitable tool for the case company.

The evaluation results are available in Appendix 3 where the results are presented using 'traffic lights' (Green is fit for purpose – Orange is good – Red not suitable) for better visibility in the comparison. Each of the tool has been ranked with points from one to three in each evaluation criteria / requirements and each of the evaluation criteria / requirement has a weighted percentage to the overall ranking. This evaluation result was then evaluated together with service provider evaluation result to choose the best match that works together.

Tool one has the second-best evaluation results in overall. License costs of the product is not the cheapest one but deployment costs are low. Licensing model is clear and acceptable but usability of the tool does not seem to be easiest possible due to it requires more customization than others. Features of the tool are comprehensive and it supports all the products needed by the case company. Tool can be bought without a service and managed internally if wanted so the tool is compliant to the case company sourcing policy. Reviews from the products are excellent but to pilot it is not as easy as it could be. Available vendors providing support and service for the tool can be found from Finland and those companies are small enough to provide tailored and flexible service but service providers met did not give the best possible feeling. Service price is not the cheapest

one but otherwise the product would be suitable for the case company usage. Internal feedback and vendor interviews were mixed and not scoring the highest points.

The third tool is clearly the worst option for the case company mainly due to it cannot be bought as a tool alone but comes only with the SAM service. This would raise the initial tool and service costs and would not allow to start small with the new service. Features of the tools and supported products are matching the company requirements but all the other evaluation criteria are met only partly or not at all.

Tool two got the best evaluation results and it was clearly the best one on each evaluation criteria. License model and the price is the best one and licenses costs can be easily measured, monitored and future consumption can be estimated. The tool interface is modern and easy to use but still providing excellent reporting functionalities. This tool supports also all the products in the scope and the license even includes some features that were not in the planned scope. The tool can be purchased as a service or managed internally. The tool claims to be the best software asset management tool on the market and service providers are supporting the claim. Feedback from the other companies was also very positive and suitable SAM service providers are also supporting this tool. Based on the results this tool is clearly the choice for the IT transformation.

#### *Asset automation and end-user services*

Increasing automation everywhere where it is possible is something wished almost by everyone but mainly it is required for the testing along with the automation that cloud platform will bring. Identity and access management is also something that would require automation to ease new employee entrance process for example.

End-user services should be increased as well. This will reduce the wait time for the end-users and it is also seen soon as a mandatory feature in the corporate environment due to people are used to get that kind of service at their free time. Many interviewed persons referred to situation where there is a need for a new application to the personal tablet and it is not possible to just go to the store and get it installed automatically without any technical knowledge. Of course, it must be remembered that corporate environments must be more secure and standardized which set some limits for the automation as well.

End-user software order portal where the user can order software without contacting service desk is seen one of the key end-user services that should be implemented. End-

user software order portal with automated approval process, license harvesting and provisioning would increase the end-user satisfactory and would free-up time for multiple IT units.

After analyzing the different scenarios, it is quite clear that regardless of the use case the automation and end-user services require a working asset management service to work efficiently.

#### **4.4 IT Transformation Proposal**

IT transformation is a process which will take years to complete and to make sure that company is on the correct patch 3<sup>rd</sup> party consultancy was used to create IT transformation program plan and proposal for the case company. Due to the confidentiality only a high-level plan of the IT transformation is shared here.

The IT transformation proposal for the case company consists of four phases as shown in the list below. Each of the phase will be executed using agile practices and work will be split to three weeks sprints. KanBan project management practices will be used to manage the tasks and workflow. Between each sprint the progress will be evaluated and scope will be adjusted if needed. Product owner will steer the program with to be selected stakeholders on weekly basis.

##### **Phase 1 - Cloud Adoption Blueprint and Strategy**

- Global operating model assessment.
- Cloud strategy & roadmap.
- Public cloud pilot and proof of concept.
- Public cloud readiness.
- Create a new IT service: Global Cloud Services.
- Design of initial governance and support model for public cloud platforms.
- New network architecture.
- Global infrastructure survey.
- Pilot software asset management tool and service.
- Onboard software asset management service partner.
- Create a new IT service: Configuration and Asset Management Service.
- Revisited scope and plan for the next phases.

## Phase 2 - Transformation Planning

- Cloud transformation (migration) plan.
- Application migration testing.
- Cloud platform governance model creation.
- Cloud platform operator RFP and selection.
- New network infrastructure implementation.
- New (ITaas) IT operating model proposal.
- Local infrastructure consolidation and standardization plan.
- Revisited scope and plan for the next phases.

## Phase 3 – Transformation

- Cloud transformation begins with suitable identified workloads.
- On-boarding of cloud platform operator.
- Centralized monitoring of availability and security.
- Local infrastructure consolidation and standardization begins.
- New (ITaas) IT operating model implementation begins.
- Start building transparent cost management model based on utilization.
- Pilot workflow automation platform.
- Revisited scope and plan for the next phases.

## Phase 4 - Optimize and finalize

- Enable continuous optimization of costs and capacity.
- Asset and service lifecycle management in use.
- Finalize migrations for remaining assets.
- Continuous local infrastructure consolidation and standardization based on existing hardware lifecycle.
- Implement new emerging technologies and increase automation on every possible area.



The planned schedule for the IT transformation is illustrated in Figure 18 and the main content in each phase is presented after that.

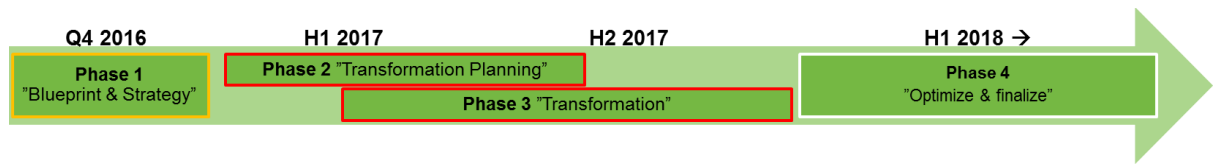


Figure 18. The case company IT transformation planned schedule

The first step in IT transformation is to plan the IT transformation program on a low level and start the transformation in phases. This will include cloud environment assessment and creating an initial cloud and network architecture and implementation of cloud readiness. Global operating model assessment will be done based on the IT transformation proposal and the whole IT globally needs to be involved. Design for the initial governance and support model for the public cloud platforms needs to be created and approved before the actual transformation may begin. To modernize, consolidate and optimize the whole IT infrastructure, all the assets needs to be identified and analyzed. Software asset management tool and service needs to be piloted and service partner onboarded to help with the overall lifecycle management planning. IT organization needs to be changed and two new services must be established; Global Cloud Services and Configuration and Asset Management Service. The main target of the phase one is to make a robust plan with a business case for the actual IT transformation. At the end of the phase one, scope and plan for the next phases needs to be re-evaluated.

The phase two target is to prepare the case company to global usage of public cloud services, select cloud operator to manage cloud platforms and preparing the organization for the coming changes by creating a new cloud governance model. Detailed application transformation (migration) must be made and all the application migrations needs to be piloted. To ensure that the new cloud based operations works the planned network infrastructure changes needs to be implemented. Network changes required consists from mesh based network topology, cloud proxy deployment, renewing the network hardware, implementing OpenDNS and changing some of the MPLS connections to Internet links. The new (ITaaS) IT operating model proposal should be presented. Local infrastructure consolidation and standardization plan needs to be proposed and global solution for the local solutions should be designed. At the end of the phase two, scope and plan for the next phases needs to be re-evaluated.

Phase three may be started in parallel with the earlier phase due to it contain public cloud migration planning tasks and migration testing activities and after those are completed certain applications can be migrated already while the other ones are still under testing. The main focus of the phase three is to start the cloud transformation, onboard the cloud operator, initiate local infrastructure consolidation and modernization and start the operating model transformation step by step. Transparency to the cost management and IT services values will be gradually increased and cooperation with the business will be strengthened. New module to the software asset management will be piloted which allows workflow automation for example for end-user software request. At the end of the phase three, scope and plan for the next phase needs to be re-evaluated.

Phase 4 will prepare the IT organization for continuous service lifecycle management and IT operations development. The new operating model and cloud services will be taken into use globally and legacy infrastructure will be transformed gradually. This phase cannot be planned on a very detailed level because its content will be completely dependent on the results, feedback and findings of the earlier phases. Everything that has been started in the earlier phases will be finished and moved to the continuous development and improvement stage. New technologies and solutions that have been identified during the earlier phases will be executed in this phase which is actually continuous process which never ends.

## **5 Project Evaluation and Conclusions**

This section contains the summary of the study, outcomes from the IT transformation proposal and next possible steps for the future IT. It also contains the evaluation of the study by comparing the outcome with the original research objective and discusses validity and reliability of the study.

### **5.1 Outcome vs. Objective**

This section evaluates the outcome of the thesis compared against the research objective defined at the beginning of this research. Validity and reliability of the thesis are also evaluated and compared to the plan which was defined in Section 1.4.

The main goal of this thesis was to investigate the need for overall IT transformation, find out best practices and make an IT transformation proposal. The proposal targeted to provide an executable framework to improve IT capabilities and readiness to meet business requirements fast and efficiently by utilizing public cloud services.

The case company strategy, business requirements and current state analysis lead to several reasons to transform IT and provided a solid high-level target for the transformation. Studying the transformation best practices, benchmarking other companies, using external consultancy and making an internal assessment proved to be an effective way to prepare a proposal for the IT transformation. To summarize, there were six main reasons to propose thorough transformation; the case company's digitalization strategy, non-global IT governance, missing agility and flexibility, outdated IT infrastructure, missing IT assets and costs transparency and workload optimization need.

Based on the current state analysis the research of IT transformation was done around the best practices and studying how other companies have transformed their own IT and what kind of transformation practices different consulting companies are offering. IT transformation proposal is a result of long analysis of requirements and creating a roadmap together with external consulting and finally crafting a project proposal for IT transformation.

IT transformation project proposal was presented to the management of the case company and it was accepted and made one of the company's spearhead programs led by the author. With these results, the outcome of this research reached its initial targets.

### *Outcome of the IT transformation proposal*

The main objective of the thesis was to create an executable IT transformation proposal for the case company and as stated in the previous section and it was approved and started in the case company. The current state analysis identified also that without a transparent visibility to the assets and costs, IT transformation will be much difficult to execute and study proved that software asset management plays a key role in IT transformation and future IT operating model. Based on the analysis of the case company's maturity and study of technical solutions the proof of concept for the software asset management tool and service were requested from different vendors as part of the IT transformation proposal preparations. A proof of concept was started immediately after the IT transformation proposal was approved and it was completed with satisfactory results and very positive feedback. Additionally, based on the study a new service called configuration and asset management service was created and the author was nominated to be the service owner for it.

The scope and targets defined in the IT transformation proposal have already reached phase three during the finalization of this research and the main practical outcomes in addition to the new configuration and asset management service are the following;

- New Global Cloud Services IT service was established as proposed.
- Public cloud capability was established.
- Cloud transformation for the core global services have reached 85% completeness by end of the year 2017.
- IT operating model have taken steps toward ITaaS operating model.
- SAFe framework will be taken into use.
- DevOps practices will be enhanced and test automation increased heavily.
- End-users services and workflow automation have been piloted and will be taken into use early 2018.
- Corporate digitalization strategy has been supported by enabling the cloud capabilities and enhancing the case company IT infrastructure and especially the network part.

To summarize the outcome of the transformation has been way more successful than anticipated in the beginning of the research. In principle, all the defined targets in Section 4.4 has been reached. Many of the things that were considered to have only a small

impact turned out to play a bigger role during the transformation and vice versa but in overall the whole plan turned out to work as planned.

## **5.2 Validity and Reliability**

This study was carried out according to the case study research approach using qualitative research methods making the examination of validity and reliability an essential part of this research approach. The validity and reliability plan was defined and explained in Section 1.9 to support the introspection after the research is ready. In qualitative research, validity can be measured by questioning if the results of the thesis answers to the initial research question and achieves the target. This study was able to produce top quality IT transformation proposal which was accepted and initiated, therefore the thesis can be considered to fulfilled the research question defined in the beginning.

Data used and collected for the research needs to be accurate and interpretation of the data should avoid the researcher bias. This has been done by using data only from the trusted sources like the case company internal documentation, academic articles and subject matter experts' material on trusted and known web pages. IT transformation proposal was also presented in written and verbal way to the case company IT management resulting to acceptance from all the stakeholders.

Reliability in qualitative research can be measured by questioning if the results of the research would be the same if another person does the same research or if the research would be done at a different point in time. Getting same results for this research would be most likely if the researcher would be different but the same data sources would be used. The data sources such as interviews and discussions with the key stakeholders, reviewing the case company documentation, making internal operating model analysis and using same external consultancy to make IT landscape assessment would mostly probably lead to the same or similar conclusions. The content and approach for the IT transformation framework in the literature would also support the same or similar outcome. However, if the research would be done at a different point in time, the case company's IT infrastructure and operating could be different and proposed IT transformation could vary from the one presented in this thesis. The business is evolving all the time and IT along with them so the time is a critical factor for this kind of research. To provide extra reliability for the thesis it can be improved by using different data sources, data collection methods and maintaining a well-documented research process. In this research, the following seven different methods were used for data collection; interviews,

discussions, workshops, multilayered business reasons and requirements gathering for the IT transformation, analysis of the corporate documentation, IT infrastructure assessment and help of external consultancy. The overall research design and process was developed before starting the study and it was followed accordingly.

To increase reliability and validity of the outcome would have required more resources and time to make more thorough analysis for the case company IT operating model and existing infrastructure. However, because the technologies are changing so rapidly and proposal execution happens in an agile way the additional time that could have been spent on the proposal preparations would have been waste of time anyway due to it not being possible to plan everything beforehand.

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## Appendix 1. Global IT Services in the Case Company

Service Category	Service	Short Description	Utilization
Support Services	Servicedesk	IT Support and IT related tasks for all users in all units	Globally
Support Services	Local Support (Local Deskside support and local IT services)	Available on certain sites	Globally
Hosting	Telcom Finland	Hosting of the service	Finland
Hosting	Web Services	Hosting of the service	All units
Hosting	Hyperion HFM	Hosting of the service	All units
Hosting	Siebel CRM	Hosting of the service	All units
Hosting	QPR	Hosting of the service	All units
Hosting	IFS	Hosting of the service	All units
Hosting	SAP	Hosting of the service	All units
Hosting	Enovia (PDM)	Hosting of the service	All units
Hosting	Solidworks Enterprise PDM	Hosting of the service	All units
Hosting	Autodesk Inventor	Hosting of the service	All units
Hosting	SQL Cluster	Hosting of the service	All units
Hosting	LAN	Hosting of the service	Site by site
Hosting	Storage	Hosting of the service	All units
Hosting	VmWare environments	Hosting of the service	All units
Hosting	Microsoft licensing	Hosting of the service	All units
Hosting	Misc. Licensing	Hosting of the service	All Units
Hosting	Cloud Service Providers	Hosting of the service	All Units
Global PLM SELL & Eng Applications	Siebel CRM	Prospect/ account and opportunity/ sales pipeline management	All units
Global PLM SELL & Eng Applications	Dynamics CRM	Customer / account and opportunity/ sales pipeline management	All units
Global PLM SELL & Eng Applications	Sales Tools	Product data support for sales process	All units
Global PLM SELL & Eng Applications	QPR	Process modelling tool	All units
Global PLM SELL & Eng Applications	EDM (Solidworks Enterprise)	SolidWorks and AutoCAD data management	Selected Engineering units
Global PLM SELL & Eng Applications	EDM (Autodesk Vault)	Autodesk Inventor and AutoCAD data management	Selected Engineering units

Global PLM SELL & Eng Appli- cations	PDM (Enovia)	Product data management	All units
Global PLM SELL & Eng Appli- cations	eCatalogue	Service spare part	All units
Global PLM SELL & Eng Appli- cations	PDM (Aton)	Product data management	Filters
Global PLM SELL & Eng Appli- cations	Engineering applications (Plant)	Plant Engineering applications	Engineering in Finland
Global PLM SELL & Eng Appli- cations	Engineering applications (Mech)	Mechanical engineering applica- tions	Engineering in Finland
Global PLM SELL & Eng Appli- cations	Engineering application (EIA)	Electrical, instrumentation and automation engineering applica- tions	Engineering in Finland
Global PLM SELL & Eng Appli- cations	Engineering application (Bentley)	Bentley products with ELS agreement	Selected Engineering units
Global PLM SELL & Eng Appli- cations	Engineering applications (Elmas)	Event Logic Modeling and Anal- ysis Software	Finland in O&M
Global PLM SELL & Eng Appli- cations	Engineering applications (Aveva)	Engineering apps	Engineering units
Global PLM SELL & Eng Appli- cations	MDM (EBX)	Master Data management sys- tem	All units
Global PLM SELL & Eng Appli- cations	Plant DMS (Meridian)	Document management system for handling primarily project documents	All units
Global PLM SELL & Eng Appli- cations	Jira, Confluence, Bitbucket	Agile development management content management source code management	All units
DelSol,DMS,Supply FC,HR Apps	ERP (SAP), DelSol Ser- vices	ERP system services for solu- tion delivery processes	All units
DelSol,DMS,Supply FC,HR Apps	ERP (SAP),DelSer Ser- vices	ERP system services for service processes	All units
DelSol,DMS,Supply FC,HR Apps	ERP (SAP), Manufacturing Services	ERP system services for manu- facturing processes	All units
DelSol,DMS,Supply FC,HR Apps	ERP (SAP), FI/CO Ser- vices	ERP system services for finan- cial processes	All units
DelSol,DMS,Supply FC,HR Apps	ERP (SAP), HR Services	ERP system services for HR processes	All units

DelSol,DMS,Supply FC,HR Apps	ERP (SAP), Reporting Services	ERP system services for reporting	All units
DelSol,DMS,Supply FC,HR Apps	ERP (SAP), AMS	ERP, external application support service	All units
DelSol,DMS,Supply FC,HR Apps	IFS	ERP system services for financial, administrative and operative processes	Filters
DelSol,DMS,Supply FC,HR Apps	Hyperion HFM	Financial reporting and consolidation system	Used by all legal companies
Collaboration services	Office 365	Collaboration platform (Outlook, SharePoint, Yammer, OneNote, OneDrive, Delve, Office 365 Video, Office Package)	All Units
Collaboration services	Sigma	Request database for data e.g. Customer, Site, Items etc.	All Units
Collaboration services	Operating Model Handbook	Documents related to operative processes, master data and applications.	All units
Collaboration services	Episerver	Publishing tool for Intranet and Internet	All units
Collaboration services	Notes Databases	Various Notes databases for internal use, with Notes and web eg. Events database template for project communication, Sigma etc.	All units
Collaboration services	Video conferencing	Video conferencing, content sharing	Selected Units
Collaboration services	ID Badge	ID Badges creation and administration	All Units
Infrastructure Service	PC Standards	Common workstation environment	All units
Infrastructure Services	Server standards	Recommendations for server hardware	
Infrastructure Services	Wide Area Network (WAN)	The Wide Area Network Service (WAN) is the internal private global IP data network connecting different locations	All units
Infrastructure Services	Partner connections (PVW)	Connectivity between customer networks	Utilized case by case
Infrastructure Services	Active Directory (TD)	Provides authentication and authorization services for most services used in the network.	All units
Infrastructure Services	Anti-Virus Control (AVC) + WSUS	Antivirus software management Windows patch management	All units
Infrastructure Services	Disk Encryption Service (DES)	Encrypt workstation disks and removable devices	All Laptops and mobile users

Infrastructure Services	Internet Access (INT)	Allows Internet Access (INT) from the WAN using a standard web browser, i.e. Internet Explorer	All units
Infrastructure Services	Remote Access Service (RAS)	Service to connect to internal resources via VPN tunnelling	All remote and mobile users
Infrastructure Services	Dial-UP X-way (DXW) OBSOLETE	An optional dial-up service iPass (DXW) is available for all employees	All remote and mobile users
Infrastructure Services	Client management service (CMS)	Installation and management of workstations and laptops	All units
Infrastructure Services	Client management service (CMS)	Workstation images / Altiris	All units
Infrastructure Services	DMZ	DMZ infra, overall services, updates, security etc	All units
O&M Applications	Enterprise Asset Management (Maximo)	Asset Management Tool for asset management on sites	O&M Units
O&M Applications	Manufacturing Execution System (GE Proficy)	MES system for managing operations at site	O&M Units
O&M Applications	Manufacturing Execution System (OsiSoft)	MES system for managing operations at site	O&M Units
O&M Applications	O&M Applications, AMS	Applications for O&M service	O&M Units

Weighted Ranking %	Evaluation Criterias / Requirements	Vendor / Service Provider								
		Vendor 1			Vendor 2			Vendor 3		
		Points	Weighted Points	Details	Points	Weighted Points	Details	Points	Weighted Points	Details
25 %	Cost Efficiency	1	0,25	Full service with high price	3	0,75	Modular service model	3	0,75	cost vs. content is good
5 %	Deployment Costs	3	0,15	Easy deployment	3	0,15	Easy deployment	1	0,05	Complex deployment compared to others
5 %	Piloting Costs	3	0,15	Cheapest piloting costs	2	0,1	Average price	1	0,05	Much higher compared to others
20 %	Service Content	3	0,6	Fulfilling the requirements	3	0,6	Fulfilling the requirements	3	0,6	Fulfilling the requirements
10 %	Service modularity / sourcing	2	0,2	Some modularity	3	0,3	Modular service model	1		Not enough modular
10 %	Pros	2	0,2	<ul style="list-style-type: none"> <li>- Price of the POC is decent</li> <li>- Dedicated service and tailored content</li> <li>- Full hardware and software inventory and SAM tool for 3 months</li> <li>- SAM tool price after POC period</li> <li>- 3 products can be analyzed (audited) during the POC</li> </ul>	3	0,3	<ul style="list-style-type: none"> <li>- Price of the POC is cheapest</li> <li>- Dedicated service is expected</li> <li>- Full software inventory (raw data)</li> </ul>	3	0,3	<ul style="list-style-type: none"> <li>- The complete tool in use for 6 months (with snapshot information).</li> <li>- POC contains full license report and high-level compliance report for all the softwares.</li> <li>- Price of the Service</li> <li>- Synergy benefits (MS EAS, Service provider for other services).</li> <li>- Some of the available credits could be used for this?</li> <li>- Possibility to reduce the POC price from the 1st year SAM Service costs</li> </ul>
10 %	Cons	2	0,2	-	3	0,3	<ul style="list-style-type: none"> <li>- POC restricted to MS SQL only</li> <li>- Actual SAM tool usage not included in POC (only reports)</li> <li>- Price of the Service</li> </ul>	1	0,1	<ul style="list-style-type: none"> <li>- High Price for the PoC</li> <li>- Do we get enough flexiple and customized service?</li> </ul>
5 %	Internal Specialists feedback	2	0,1	Very professional but sales failing	3	0,15	Good impression, seems flexiple	1	0,05	Too big company to provide agile and flexiple service
10 %	Vendor reputation	3	0,3	Very good feedback	2	0,2	Good feedback	2		Mixed feedback
100 %										
		21	2,15		25	2,85		14	1,9	
		Total Points	Total Weighted Points		Total Points	Total Weighted Points		Total Points	Total Weighted Points	
		2	2		1	1		3	3	
		Non-Weighted Ranking	Weighted Ranking		Non-Weighted Ranking	Weighted Ranking		Non-Weighted Ranking	Weighted Ranking	

Figure 19. SAM service provider selection evaluation

Weighted Ranking %	Evaluation Criterias / Requirements	Tool								
		Tool 1			Tool 2			Tool 3		
		Points	Weighted Points	Details	Points	Weighted Points	Details	Points	Weighted Points	Details
15 %	License Costs	2	0,3	More expensive than others	3	0,45	Cheapest	1	0,15	No price separately for tool
5 %	Deployment Costs	3	0,15	Easy to deploy	3	0,15	Easy to deploy	1	0,05	Comes only as a service
5 %	Licensing Model	3	0,15	Based on installed clients (SaaS) Own installation + installed clients	3	0,15	Based on installed clients (SaaS) Own installation + installed clients	1	0,05	No licensing - comes along the service
10 %	Usability	2	0,2	Suitable	3	0,3	Suitable	2	0,2	Not Suitable due to cannot be managed internally
5 %	Features of Tool	3	0,15	Covers all the requirements	3	0,15	Covers all the requirements	3	0,15	Covers all the requirements
5 %	Supported Products	3	0,15	Covers all the requirements	3	0,15	Covers all the requirements	3	0,15	Covers all the requirements
10 %	Can be bought without a service	3	0,3	Yes	3	0,3	Yes	1	0,1	No
5 %	Can be managed internally	3	0,15	Yes	3	0,15	Yes	1	0,05	No
5 %	Reviews	3	0,15	Good Reviews	3	0,15	Good Reviews	1	0,05	Mixed reviews
5 %	Easiness to Pilot	2	0,1	Quite Easy	3	0,15	Easy	1	0,05	Complicated
10 %	Support / Service price	2	0,2	Medium price	3	0,3	Cheapest	1	0,1	The most expensive
5 %	Support / Service vendor	2	0,1	Good vendor providing the tool	3	0,15	Excellent vendor providing tool	1	0,05	Vendor cannot be selected
5 %	General fit for the purpose and business requirements	3	0,15	Fulfils the requirement	3	0,15	Fulfils the requirement	2	0,1	does not meet all requirements
5 %	Internal Specialists feedback	2	0,1	versatile	3	0,15	versatile and easy to use	1	0,05	Comes only as a service
5 %	Vendor interviews for the tool	2	0,1	Good but high price	3	0,15	Very good reviews	2	0,1	Not so many reviews available
100 %										
		38	2,45		45	3		22	1,4	
		Total Points	Total Weighted Points		Total Points	Total Weighted Points		Total Points	Total Weighted Points	
		2	2		1	1		3	3	
		Non-Weighted Ranking	Weighted Ranking		Non-Weighted Ranking	Weighted Ranking		Non-Weighted Ranking	Weighted Ranking	

Figure 20. SAM tool selection evaluation



Table 11. New Era workshop work packages

Work Package	Details	Action Points
<b>Process development</b>	<ul style="list-style-type: none"> <li>- ITIL based processes should be used</li> <li>- The case company is lacking many processes completely and several issues in existing ones               <ul style="list-style-type: none"> <li>- Demand management process needs to be created</li> <li>- Incident and Change management not separated clearly enough</li> </ul> </li> <li>- Process owners and product owners roles needs to be described</li> <li>- Portfolio management requires attention</li> </ul>	Process Workshop to be arranged during the Autumn time
<b>Increase development work "more development, less run"</b>	<ul style="list-style-type: none"> <li>- More automation required (especially test automation)</li> <li>- Utilize self-service more</li> <li>- The case company is concentrating too much running the IT and updating the existing infrastructure.               <ul style="list-style-type: none"> <li>- This needs to change and time needs to be freed</li> </ul> </li> <li>- Road-maps are missing for many services               <ul style="list-style-type: none"> <li>- Road-map for the service enhancement and for new things (dev)</li> </ul> </li> <li>- There is a need for more clear development budget</li> <li>- Development portfolio to be taken into use</li> </ul>	<ul style="list-style-type: none"> <li>- Initiate service road-map creation</li> <li>- evaluate smart outsourcing to free time for development</li> <li>- prioritization of every activities to prevent overload</li> </ul>
<b>Workload placement</b>	How do we utilize all the IT resources most efficiently?	<ul style="list-style-type: none"> <li>- Market are IT skills mapping and involvement more to the global activities</li> <li>- Identify and analyse the current workload and re-organize the work to optimize the skills and utilization</li> </ul>
<b>Roles and responsibilities</b>	<ul style="list-style-type: none"> <li>- Roles and responsibilities needs to be revisited and clearly documented</li> <li>- Real responsibilities like cost ownership needs to be taken into use</li> <li>- Service cost predictability will increase</li> </ul>	Analysis of operations development by re-arranging the IT services and responsibilities
<b>Project and run cost management</b>	<ul style="list-style-type: none"> <li>- Business cases should be a must for all the projects</li> <li>- Project portfolio to be used</li> <li>- ROI measurement needs to be taken into use</li> <li>- Global financial transparency must be one of the targets on long run</li> <li>- This requires also visibility to local run and development road maps!</li> </ul>	<ul style="list-style-type: none"> <li>- Take project portfolio in use for all the projects</li> <li>- Process to control project startup               <ul style="list-style-type: none"> <li>- Clear and approved business case and ROI for all the projects must exists before they can be started</li> </ul> </li> </ul>
<b>One IT</b>	<ul style="list-style-type: none"> <li>- Common and standardized ways of working are needed globally</li> <li>- Transparency to everything is needed</li> <li>- Globally shared resources needs to be enabled</li> </ul>	<ul style="list-style-type: none"> <li>- Workshop required with market area ICT heads (2H 2015)               <ul style="list-style-type: none"> <li>- regional IT involvement in 2nd phase</li> </ul> </li> <li>- Common ways of working globally               <ul style="list-style-type: none"> <li>- IT budgeting guidelines</li> <li>- IT roadmap guidelines</li> </ul> </li> <li>- Strategy Execution Road-Map creation               <ul style="list-style-type: none"> <li>- Development guidelines</li> <li>- Global transparency</li> </ul> </li> </ul>
<b>Technology stack</b>	<ul style="list-style-type: none"> <li>- A need to have global visibility to all the technologies we are using in order to manage the technology stack</li> <li>- We are not able to create it in some cases due to vendors are actually doing the development - lack of visibility</li> <li>- We should have global preferences:               <ul style="list-style-type: none"> <li>- e.g. SQL preferred already but is it clearly communicated?</li> <li>- OS preference? Windows?</li> <li>- Repository discussed that it would be Atlas but no decision yet?</li> <li>- Integration platforms standardization?</li> </ul> </li> <li>- Architecture / Strategy               <ul style="list-style-type: none"> <li>- More discussions needed with Enterprise Architecture team</li> </ul> </li> </ul>	Evaluate and initiate asset management PoC
<b>SLA / delivery times</b>	<ul style="list-style-type: none"> <li>- Expectations needs to be clarified and discussed with business if the expectations are realistic and what are the cost impacts</li> <li>- with technology we can adjust the delivery times but is that needed or cost efficient?               <ul style="list-style-type: none"> <li>- How do we measure something what we haven't agreed?</li> </ul> </li> <li>- service mapping to SLA</li> <li>- What is the SLA for the service</li> <li>- What is the SLA for the request</li> <li>- Service Portfolio               <ul style="list-style-type: none"> <li>- Service SLA</li> <li>- Request SLA</li> <li>- Measurement</li> </ul> </li> </ul>	Enable SLA measuring capability
<b>Cost Transparency</b>	<ul style="list-style-type: none"> <li>- Core applications costs are global and cost break-down existing but even for those the end to end costs are not available</li> <li>- Infrastructure costs missing and not mapped to the applications</li> <li>- local application servers costs missing</li> <li>- infra work missing</li> </ul>	Global costs transparency to be started from budgeting